THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXX. No. 749.] LONDON, SEPTEMBER 18, 1877. [29th Year.] Price 6d.

ESTABLISHED 1782.

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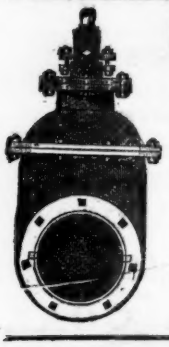
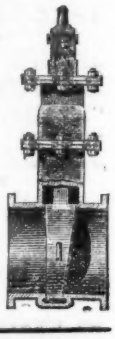


C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



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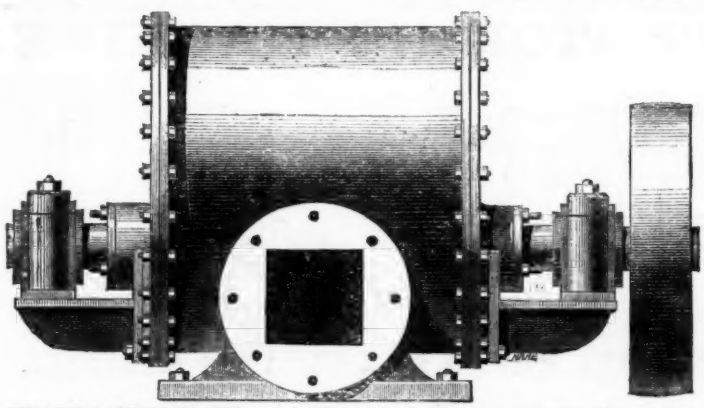

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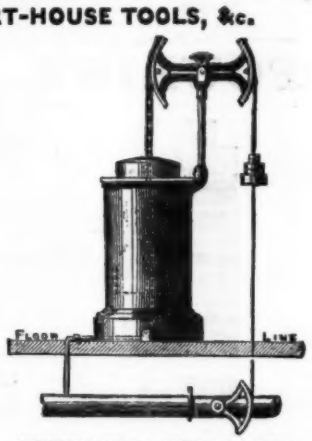
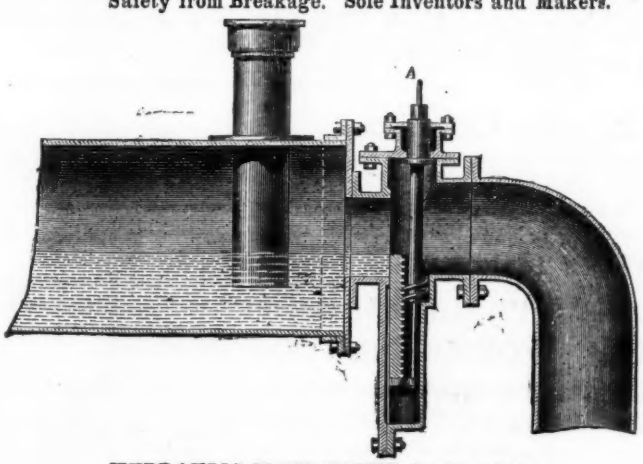


HYDRAULIC REGULATOR.



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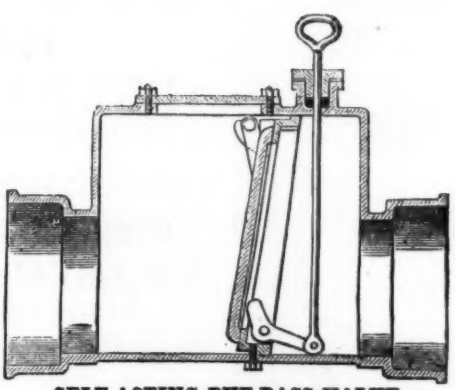

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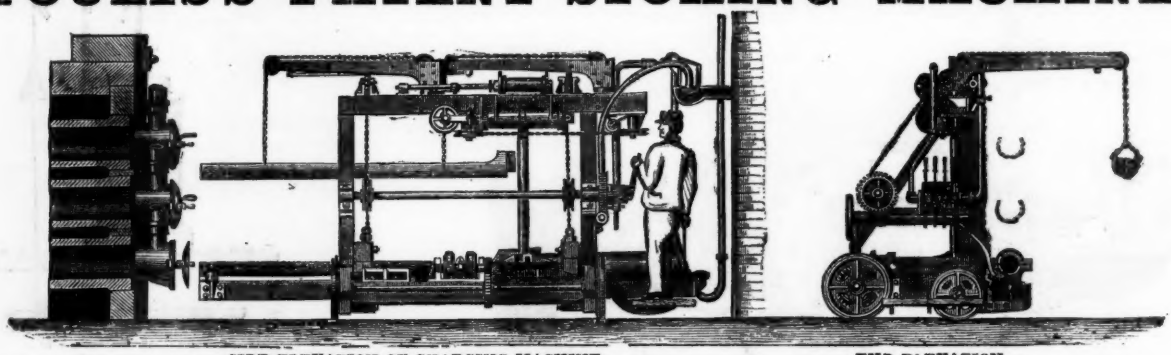

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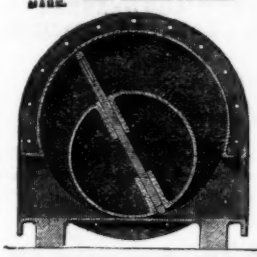

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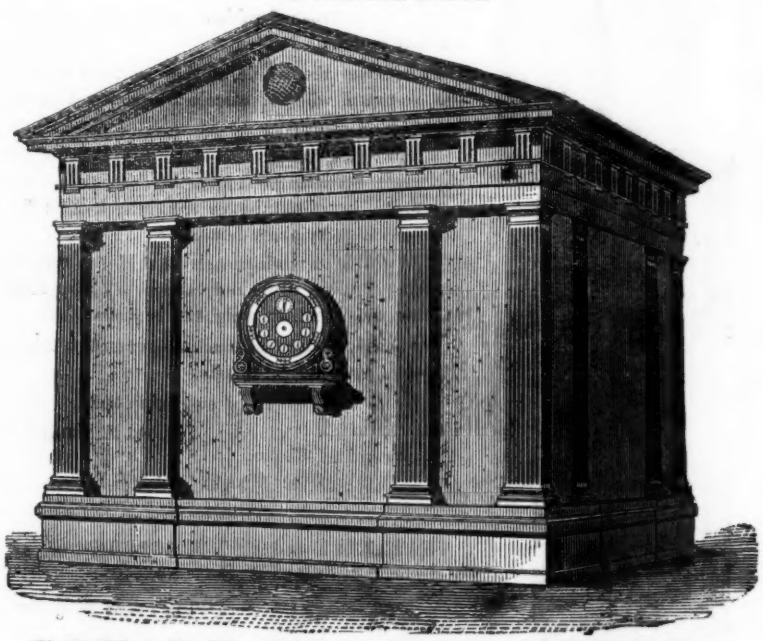

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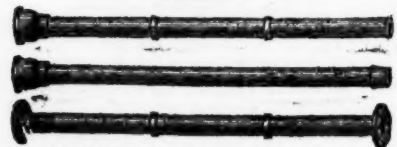
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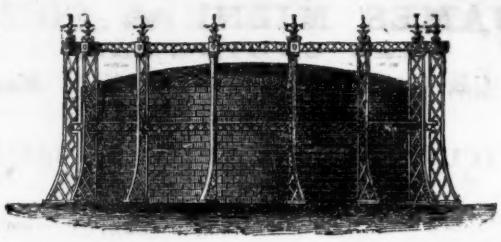
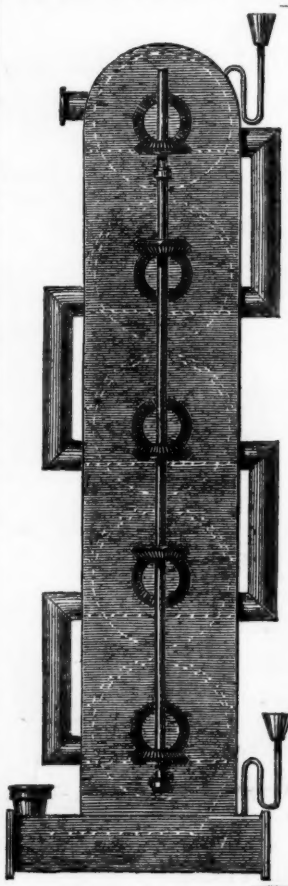
Prices on application.


THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

GEORGE ANDERSON,
GAS AND CONSULTING ENGINEER,
35A, GREAT GEORGE STREET,
WESTMINSTER, S.W.

ANDERSON'S
PATENT
COMBINED WASHER AND SCRUBBER.

TESTIMONY OF ITS ACTION.
The Gas-Works, St. Albans, April 27, 1877.
DEAR SIR,
Your Brush Scrubber has been in action here for four months.
It removes the whole of the ammonia from the gas, so that it will not discolour moistened turmeric paper.
The brushes cause no appreciable increase of pressure, and there is no repumping of liquor. Clear water run in at top, issues from the bottom fit to proceed to the sulphate-house.
It performs its work more efficiently than the tower scrubber I have, while only about half the height, and not one-fourth its weight or capacity.
My purifiers also last much longer before they are foul than they did previously.
I am, yours truly,
A. F. PHILLIPS.
G. Anderson, Esq.,
35*a*, Great George Street, S.W.

PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS—giving great Economy of Fuel.
STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.
FUEL-MACHINE, for Compressing Breeze and Tar.
N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.
PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

TANGYE BROTHERS AND HOLMAN,

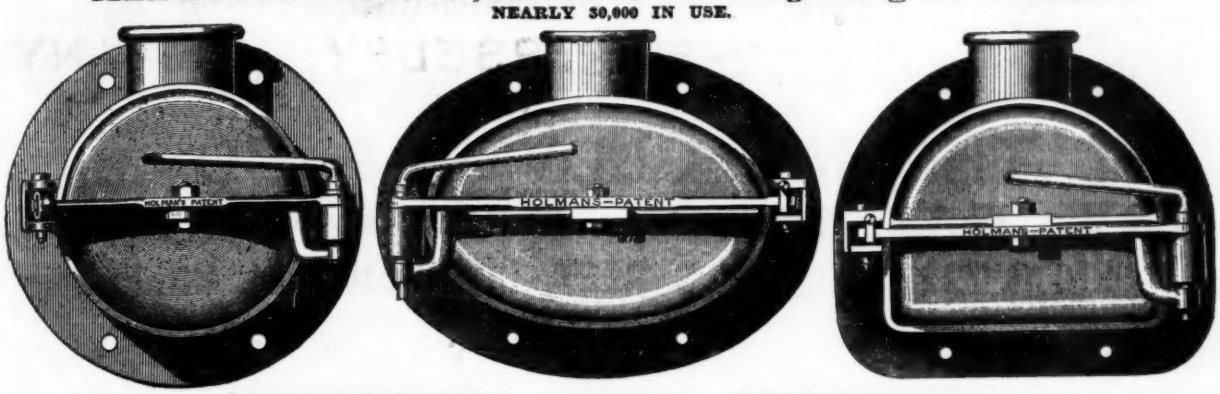
10, LAURENCE POUNTNEY LANE, LONDON, E.C.

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.

NEARLY 30,000 IN USE.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), being now in use in nearly all the principal Gas-Works in London and the Provinces.

Messrs. T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT ITSELF (see Illustrations above), instead of, as heretofore, bringing the Mouthpiece from the D or Oval at back to Circular in front.

D and Oval Morton's Lids have now been working satisfactorily for the past two or three years, both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland).

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dronfield, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

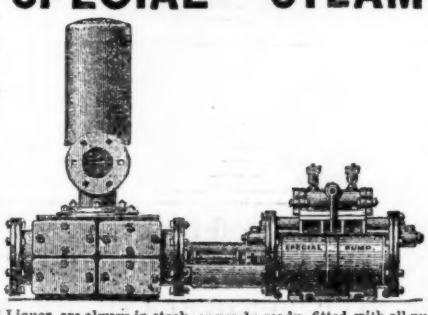
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.

(ESTABLISHED 1816)

ARE THE ONLY MAKERS

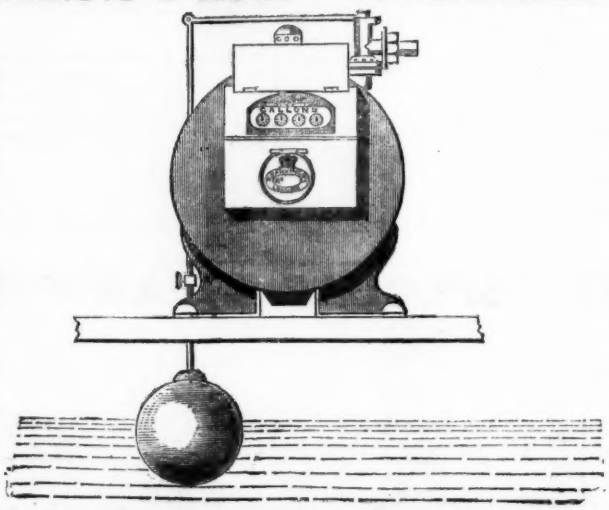
OF THE

LOW-PRESSURE WATER-METER.

These Meters will register with perfect accuracy, either at full speed, or with a few drops only passing through them.

They must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below. Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply at the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



From "The Engineer," April 6, 1877.

"Low-pressure Meters have been found to register with almost perfect accuracy, or, at all events, within 5 per cent. either for or against the consumer, and from the nature of their construction are by no means easily deranged. Still, even the low-pressure meters have their disadvantages, but these are chiefly as respects the question of first cost, seeing that they must have a cistern fixed at a higher level than that at which the supply is needed. All things considered, however, the balance of opinion rules at present in favour of the low-pressure Meter, and they are consequently increasing in favour as time goes on."

These Meters have been manufactured by W. P. & Co. for more than 25 years, and are largely used by the following and other Water Companies:—

NOTTINGHAM, DERBY, LEICESTER, SUNDERLAND, GREAT YARMOUTH, SHEFFIELD, NORWICH, LOWESTOFT, COVENTRY, SOUTHEND.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 18, 1877.

Circular to Gas Companies.

It is not surprising that the question of gas measurement, raised in the last Report of the Warden of the Standards, to which we alluded last week, should continue to attract attention. To the general public the meter is a "box of mystery." Knowing nothing of its beautifully simple construction, they regard it with some sort of awe, and, we fear, but too often consider it an instrument of extortion. The letters which have recently been published in some of the daily papers certainly contain statements which must, in the minds of the uninformed, raise strong doubts as to the value of the meter as a measurer. It may, however, be admitted that, while the complainants are few, the satisfied are many.

We may candidly confess that we are utterly at a loss to account for and explain some of the extraordinary allegations made, which we assume to be truthful. That the consumer often deludes himself with the notion that he has burnt no more gas in a given quarter of a year than he did in the corresponding quarter of a previous year, may be considered as certain. But that the amount of his consumption should be nearly quadrupled, with the same number of burners in use, seems almost inconceivable. There must be some strange hallucination or a wide source of error somewhere. Here then is a matter for investigation. We may take it that next session of Parliament will see an attempt made to amend the Sales of Gas Act, and the opportunity will arise to consult with meter makers as to their construction and their use. There are many, practically engaged in the manufacture, who are capable of giving most valuable information. We are not exactly in love with Royal Commissions, but they have this advantage over a Select Committee of either House of Parliament. A Royal Commission may be composed of gentlemen who have a knowledge of the matter with which they are dealing, while the members of a Select Committee may be in profound ignorance of the subject on which they have to adjudicate. For this reason we are inclined to urge that, as a preliminary to legislation, an inquiry should be held by a competent body of Commissioners. It is most desirable that the cause of these strange anomalies in the registration of gas-meters should be clearly elucidated, and the public mind reassured. There are eminent manufacturers who would be quite willing to give the Commission the benefit of their wide experience. It is almost invidious to mention names; but we are certain that such men as Colonel Croll, Mr. Warner, Mr. W. Sugg, and Mr. Hartley, would soon clear away the difficulties which now perplex the minds of a good many gas consumers. It is due both to meter makers and Gas Companies that such an inquiry should be held, for both now lie under an imputation of unfair dealing—the one of making, and the other of letting out for hire, defective instruments. The complaints come to us from all parts of the country; they affect alike Local Authorities and Gas Companies, and we are quite certain that an inquiry of the kind we suggest would be hailed with universal satisfaction. The question of the examination of meters cannot be left in its present state. The Warden of the Standards has raised a ghost, which can only be laid by fresh legislation, and such legislation we shall look for at the earliest possible date. It must, however, be preceded by inquiry, and we hope that one will soon be instituted. It need not be long or expensive. A week's work would obtain all the information necessary to form the basis of any alterations of, or additions to, the Sales of Gas Act, if the Commissioners be practical men.

It is due to the meter manufacturers to say that, in 1860, they themselves proposed exactly the amendments of the Act of 1859, and the additional provisions which are now suggested in the Report of the Warden of the Standards.

To our great disappointment, the "Sulphur Question" has cropped up in Maidstone, where we hoped it was for ever disposed of. In April last, it would appear that the gas of the Maidstone Company contained only, in round numbers, thirteen grains of sulphur per hundred feet. The week before last, we are given to understand, it contained fifty-three grains per hundred feet. Now, how is this wide difference to be accounted for? The same system of carbonization is carried on, and consequently the only explanation to be found is the use of a highly pyritic coal, or some changes in the mode or materials of purification. When Mr. West's method of carbonization is employed, pyritic coal should be especially avoided; and, at all times and in all places, methods of purification which are found to be successful should be uniformly followed. There is somewhere, we believe, to be seen over the grave of a hypochondriac an epitaph to the following effect:—"I was well; I would "be better; and—here I am." Now, gas managers who are doing well—and we regard anything under twenty-five grains of sulphur in the hundred feet as a most satisfactory state of purity—cannot do better than continue the process of purification which has brought the sulphur to this low rate. If Mr. West will carefully compare the conditions which obtained last April with those which exist to-day, he will be at no loss to account for the increase of sulphur, and will easily arrive at a solution of the difficulties which beset him at the present moment.

A very short, and, we may say, a very modest report of the Special Gas Committee of the Corporation of London, officially informs the Common Council of the rejection of the Bill promoted by the Chartered Company to relieve themselves of the sulphur difficulty. The case is so recent, that our readers will have fresh in their minds all the facts deposed to, and the opinions expressed, in the course of the lengthened inquiry which took place. The Common Council are quite welcome to their glorification, and we should hardly have alluded to the matter, but that we find a mysterious paragraph in a medical contemporary, which may create altogether false impressions. The writer is rather more vague in his statements than medical authors usually are, but we gather that his opinion is that impure gas, or, as he puts it, the "noxious vapour," supplied by the Metropolitan Gas Companies has quite as much influence on the death-rate as impure water. Of this we have no doubt, inasmuch as we believe that no harm is done to health by either the water or the gas supplied. It is satisfactory to see that the writer we notice does not go so far as to accuse gas of being a primary source of disease; he only intimates an opinion that in lung and throat diseases it may aggravate symptoms. He is of opinion, and perhaps he is right, that nothing short of a thorough draught will remove the products of the combustion of gas from a room, and render it fit for habitation. Pure gas, the writer considers, should "contain no elements except carbon, hydrogen, and a "small quantity, perhaps, of oxygen in combination. Sulphur and "nitrogen ought to be rigidly excluded in any form." It is gratifying to know that it is the avowed wish of every gas manager to supply gas as nearly as possible of the composition described by the writer in the *Medical Examiner*. There is a difficulty about it, however, of which our author does not seem to be sufficiently conscious.

It is a common saying, that "circumstances alter cases," and this appears to be the opinion of some members of the Leicester Town Council. When the Gas Company promoted a Bill, which, among other things, was to give them power to make a compulsory purchase of a piece of land which formed a portion of the Corporation estate at the south-west of the town, a great outcry was made. It was, first, that the sight was very ineligible for gas-works, and next, that the erection of gas-works on the spot would greatly depreciate the value of Corporation property, destined,

we suppose, to be let on building leases. In the event, however, as our readers know, arrangements were come to, by virtue of which the Corporation of Leicester will, next Midsummer, become the possessors of the gas undertaking. Until that time the Company will carry on the works. But the time has arrived when it is urgently necessary that additional works should be constructed to supply the rapidly increasing wants of the town, and the Company are anxious to get possession of the land they obtained power to acquire. Hereupon arises a warm discussion in the Town Council; and it is curious to remark that some members who were strongly opposed to the acquisition of the land by the Company, now advocate the site as suitable and unobjectionable. "Circumstances alter cases." But the question is not yet settled. The further consideration of the matter is, as our readers will see, deferred for three weeks. No alternative site for new works has, so far as we know, been yet proposed, so things will probably remain as they are for some time to come. If the disagreement in the Town Council give a longer life to the Company, we shall, of course, be gratified.

The Directors of the Ipswich Gas Company have given notice that, after December next, the price of gas will be reduced from 3s. 9d. to 3s. 6d. per thousand feet. We hope the long notice will be gratifying to the consumers. The poorer ones will see that they have no occasion to join a "goose" club. The Directors of the Gas Company are saving their money for them, and they may indulge in a little additional Christmas cheer in consideration of the shortened gas bills they will get on Lady-day.

The Town Council of Hull have thought better of it. They will not make an attempt to buy up the Gas Companies who supply their district. They are, very properly, afraid of the electric candle, and they think they may do a good deal with petroleum lamps in the streets. Of the former there is nothing to fear; of the latter the town would be sick in the course of a few months. What are the obstacles in the way of a fair understanding between the Gas Companies and the Corporation?

The Town Council of Exeter endeavoured to make the most of the accident which recently reduced the city to almost total darkness. They sought, first of all, to recover the penalty for a deficiency of illuminating power in the gas (£20), and then the forfeit for the failure to comply with the conditions of the supply to public lamps (£25). The Gas Company, very properly, objected to pay both. They had a good defence to the one charge, inasmuch as the "partial eclipse" was the result—we cannot say of "unavoidable cause and accident," but of what is called an accident, for the reason that the occurrence was unforseen and uncontemplated. The Town Council, we therefore think, have done wisely in not pressing for the penalty, which they probably would not have recovered, and in accepting the forfeit for breach of contract, which the Company are perfectly willing to pay.

It is hardly necessary to say that the Bristol United Gaslight Company have had a very successful half year, and pay, as usual, a full statutory dividend. The conditions of this Company almost reconcile us to auction clauses, but then it must be remembered they have been long in operation at Bristol. A sale of £10,000 share capital has recently been made, and the premiums realized amounted to more than 100 per cent. Those premiums will go far to pay for the additional works the Company are about to erect, and thus will be dividend earning capital. The Company may, perhaps, regret that they have not the sliding scale. At the half-yearly meeting just held, a talkative shareholder carried to an extreme a suggestion we threw out last week, and recommended that, in order to court popularity, the Company should supply the public lamps gratis. It was very properly urged, in reply, that all ratepayers are not gas consumers, or the proposal might be fair enough. It is quite clear that the Bristol Company deal very fairly with the Local Authorities, for, as the shareholder above alluded to pointed out, the number of public lamps is constantly increasing, while the sum received for their supply is ever diminishing. Why, then, all this hubbub about lighting the city with petroleum lamps? We cannot go so far as Mr. Giles, and recommend the Company to supply the lamps for nothing; but it is clear the Company are in a position to deal liberally with the Corporation. We are not afraid of the competition of petroleum, but wish to see Gas Companies secure in their position, and for this some sacrifice is occasionally required.

The City of Waterford Gas Company have arrived at that grand consummation, a ten per cent. dividend. It has not been accomplished without a struggle; but the outlook of the Company now seems clear, and we hope their prosperity will continue. The appeal of Mr. Nagle to the directors to deal with the people of Waterford in a conciliatory spirit will not, we are sure, be neglected, notwithstanding the bitter opposition of the Corporation in Parliament last session, and their recently expressed determination to acquire the undertaking of the Company at the earliest opportunity.

The meetings of the Hastings and Falmouth Gas Companies, and the Canterbury Gas and Water Company, may be disposed of in a few words. These Companies are all prosperous, and are able to pay full dividends. At the first-named place there is a small agitation for a reduction of price, which the directors hope to be able to make before very long.

The Farnworth Local Board are anxious to acquire the undertaking of the Farnworth and Kersley Gas Company, and they seem to imagine that the acquisition may be made by a very simple process. So it may, if the Company will agree to sell; but it must be remembered that the Public Health Act gives no compulsory powers. The Company appear to be in an excellent position, and are not likely to give way without a strong inducement. The communistic spirit displayed by Local Authorities is one of the most remarkable signs of the times. Followed to a logical conclusion, it would lead to the absorption of every trade and manufacture by municipal and local bodies. As it is, however, the action now so commonly taken by them can only be regarded as a war against capital. This is plainly avowed by the Farnworth Local Board. They want the "immense profits divided among shareholders in Gas Companies." So, too, the cotton operatives, miners, ironworkers, and others, now on strike, want the "immense profits of their employers;" and thus we go down—down towards universal poverty.

Water and Sanitary Notes.

We are sorry that we cannot congratulate the Edinburgh Water Trust on a very successful management of their undertaking; but, perhaps, the position in which they find themselves to-day was unavoidable. In the course of the last five years they have expended large sums in Parliamentary proceedings, and they have been compelled to borrow very large amounts, and will be obliged to borrow still more, for the construction of works which will not be productive for years to come. Under these circumstances it is not surprising that they find their present income inadequate to meet their expenditure, and, therefore, find it necessary to raise the water-rates. The public rate is to be doubled, and the domestic rate raised from 6½d. to 7½d. We fear that the increase in the rating will not rest here. Edinburgh is undoubtedly a prosperous city; but the population is added to but slowly. There is no great increase in rental from new consumers.

Dr. Frankland's last report on the condition of the water supplied to the Metropolis, which we publish to-day, is much more satisfactory than was to be expected, considering the season we have passed through. The supply from the Thames appears to have been exceptionally good, and it is clear that the Companies have now their filter-beds in efficient working order. No mention is made of living and moving organisms in this report. All this is very gratifying, and we hope for an entire cessation of the stupid agitation which prevailed sometime ago against the use of Thames water.

The analyses of Glasgow and Birmingham waters given by Dr. Frankland should be read with the remarks of the analyst, which will be found in our miscellaneous column. The incessant rain which has fallen in Scotland has, no doubt, rinsed a good deal of filth into Loch Katrine, and hence muddy particles are found in the water distributed in Glasgow. The Birmingham Corporation supply does not appear to have been so good as usual, an increase in organic matter being noted, and also the presence of infusoria, both, no doubt, due to inefficient filtration. No harm, however, will be done by either.

Gas Explosion at Bristol.—On Sunday night, Sept. 9, a serious gas explosion occurred at the house of Mr. Naish, bootmaker, of Queen Ann Street, Barton Hill. Mr. Naish and some of his neighbours had recently been annoyed by a smell of gas in their houses, but not having the gas-pipes laid on, they were unable to account for it. It is now surmised that there had been a leakage in the company's main, and that the escaped gas had found its way into the adjacent houses. About eleven o'clock on Sunday night, Mr. Naish, his wife, son, and daughter, were sitting at supper in the back parlour of their house, when Mr. Naish got up from the table, and went to the cupboard with a lighted lamp, and immediately upon opening the door a violent explosion ensued, which blew out the doors and windows of the house, destroyed all the furniture in the room, and seriously injured the occupants, with the exception of Mr. Naish, who, singularly enough, escaped unhurt. The loud report alarmed the neighbours, who hastened to render assistance, and helped Mrs. Naish and her son and daughter to the house of a relative who lives near. Mr. Day and Mr. Stock, surgeons, having been informed of the accident, quickly attended, and they found Mrs. Naish suffering from a severe shock to the system, and wounds upon the head; her daughter was severely bruised, and had sustained a severe cut upon the head; and the son was also badly cut and bruised. Mr. Naish, we hear, was not insured, and besides the destruction of his furniture, he has suffered serious loss by the damage done to the materials used in his business.—*Bristol Daily Post.*

Miscellaneous News.

METROPOLIS GAS SUPPLY.

COURT OF COMMON COUNCIL.

At the Meeting of this Court on the 13th inst.—The LORD MAYOR in the chair—

The Gas and Water Committee presented the following report:—

To the Right Honourable the Lord Mayor, Aldermen, and Commons of the City of London, in Common Council assembled.

We whose names are hereunto subscribed, of your Gas and Water Committee, to whom, on the twenty-fifth of January last, was referred The Gaslight and Coke Company's Bill, to watch the progress thereof, and report thereon from time to time, do certify that we were attended by the Remembrancer, who laid before us copies of the Bill, and explained to us the effect of it. By clause 2 it was sought to repeal the 30th and 51st clauses of the Act of last session, which would have enabled the company to supply gas charged with any amount of impurity they pleased without penalty, and thus render abortive the labours of the Corporation connected with the gas supply of the City for the last ten years, your committee came to the following resolution, viz.—"That in the opinion of this committee it is desirable that Mr. Remembrancer should be authorized, in conjunction with the Metropolitan Board of Works, to oppose the said Bill in Parliament." Acting on this resolution, Mr. Remembrancer, with the solicitor to the Metropolitan Board of Works, offered a vigorous opposition to the Bill.

Your committee directed the Remembrancer to call as witnesses a number of scientific gentlemen to prove the injurious effects of sulphur, and the possibility of removing it from gas without creating nuisances (although lime was used as a purifier), and also the managers of gas-works from various parts of the kingdom, to prove that they conducted the works at their stations and purified the gas with lime without creating nuisances.

The committee of the House of Commons, by their chairman, expressed a wish that the Gas Referees should be called to assist in the investigation, and accordingly those gentlemen—Mr. Vernon Harcourt, Dr. William Pole, and Professor Tyndall—attended before the committee, and were all examined.

The promoters of the Bill called two witnesses from Paris—M. Félix Le Blanc, the Professor of Analytical Chemistry to the Central School of Arts and Manufactures in France; and M. Albert Ellissen, a Chevalier of the Legion of Honour, and formerly engineer of the Paris Gaslight Company. The principal object of their evidence was to show that in Paris they tested only for sulphuretted hydrogen, not for other sulphurous compounds, and that still no complaints were made by the consumers of gas of any injurious consequences following its use. Our chairman suggested to us that it would be very desirable that the quality of the Paris gas should be tested, as it was probable that it might be superior to that supplied in London. The House of Commons committee having adjourned from the 17th of May to the 5th of June, we empowered our chairman to proceed to Paris, accompanied by Mr. Heisch and Mr. Wigner, and to examine the gas there. They found the gas on one side of the Seine to contain only 15·4 grains, and on the other 11·5 grains of sulphur. Sir Edmund Beckett pointed out, in his speech for the Corporation and the Metropolitan Board of Works, that what was done in Paris could be done in London, and that it was not the business of the opponents of the Bill to point out how it was done.

On the 6th of June the committee having heard the reply of the counsel for the gas company, ordered the room to be cleared, and the chairman afterwards stated that "The committee had decided simply to declare—'That the preamble is not proved.'"

Your committee have great satisfaction in communicating the result of their successful labours to the court.

Mr. SHUTER moved the adoption of the report, congratulating the Corporation on having succeeded, in conjunction with the Metropolitan Board, in having defeated the Bill of the company.

Mr. ROGERS seconded the motion, and the report was agreed to.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following returns of the average daily quantity of water supplied by the London Water Companies during the month of August. According to these, 134,068,057 gallons, or 609,133 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight), were supplied daily; or 250 gallons (113·6 decalitres) rather more than a *ton* by weight, to each house, and 35·2 gallons (16·0 decalitres) to each person, against a corresponding number of gallons during August, 1876.

COMPANIES.	Number of Houses, &c., supplied in Aug., 1876.	Aug., 1877.	Aver. Daily Supply of Water in Gallons* during Aug., 1876.	Aug., 1877.
Total supply	529,050	536,183	132,035,055	134,068,057
From Thames	249,052	251,810	67,150,729	66,879,519
„ Lea and other Sources	279,998	284,373	64,884,326	67,188,538
THAMES.				
Chelsea	28,675	28,741	8,729,200	9,433,500
West Middlesex	48,387	49,621	11,915,532	10,868,645
Southwark and Vauxhall	80,570	78,720	19,850,000	19,400,000
Grand Junction	36,616	37,683	12,496,397	12,237,074
Lambeth	54,804	57,045	14,159,600	14,940,300
LEA AND OTHER SOURCES.				
New River	124,652	125,749	29,274,000	29,515,000
East London	110,354	113,192	27,170,520	29,588,448
Kent	44,092	45,432	8,439,806	8,090,090

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for August, 1877, as compared with that for the corresponding month of 1876, shows an increase of 7133 houses, and of 2,033,002 gallons of water supplied daily.

Dr. Frankland reports, as the result of his analysis of the waters supplied to the Metropolis and some of its suburbs during August, that, taking unity to represent the average amount of organic impurity in a given volume of the Kent Company's water during the last nine years, the proportional amount of such impurity in an equal volume of water supplied by each of the other companies, and by the Tottenham Local Board of Health, was:—Colne Valley 0·4, Tottenham 0·5, Kent (Deptford Wells) 1·0, New River 1·4, East London 2·0, West Middlesex and Lambeth 2·2, Kent (Plumstead Well) 2·3, and Chelsea, Southwark, and Grand Junction 2·4. With the exception of the New River, the waters drawn from the Thames and Lea did not maintain in August the remarkably good quality which they possessed in July; nevertheless they were all up to the average summer standard; and, with one exception, were delivered in an efficiently filtered condition. The exception was the Lambeth Company's water, which was slightly turbid when drawn from the main. The water supplied from artesian wells to the inner circle by the Kent Company, and to the outer circle by the Kent and Colne Valley Companies, and the Tottenham Local Board of Health, was palatable, wholesome, and of most excellent quality for dietetic purposes. The Colne Valley water was also soft, and therefore well adapted for washing. The Kent Company's water from Plumstead well was very turbid from rust of iron, and the Colne Valley water was slightly turbid from minute particles of chalk. Seen through a stratum two feet deep, the Kent (Deptford and Plumstead, after subsidence), Colne Valley (after subsidence), New River, and Tottenham waters were clear and colourless; the Chelsea, West Middlesex, and East London, clear and very pale yellow; and the Southwark, Grand Junction, and Lambeth (after subsidence), clear and pale yellow.

Results of Analysis expressed in Parts per 100,000.

Companies or Local Authorities.	Total Solid Matters.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Chlorine.	Total Hardness.
Inner Circle.								
Thames—								
Chelsea	21·20	·112	·031	0	·137	·168	1·75	15·4
West Middlesex	26·00	·105	·023	0	·145	·168	1·60	19·4
Southwark and Vauxhall	26·10	·121	·019	0	·147	·166	1·60	19·1
Grand Junction	26·68	·114	·025	0	·170	·195	1·55	20·1
Lambeth	27·60	·109	·018	0	·203	·221	1·65	20·1
Other Sources—								
New River	25·40	·075	·006	0	·175	·181	1·55	19·7
East London	25·10	·103	·015	0	·137	·152	1·70	19·6
Kent (Deptford Wells)	42·60	·050	·010	0	·476	·486	2·60	28·4
Outer Circle.								
Kent (Plumstead Well)	51·40	·104	·033	0	·443	·476	4·75	30·6
Colne Valley	12·20	·021	·005	0	·343	·348	1·50	5·0
Tottenham Local Board	46·10	·019	·008	0	·436	·444	3·30	25·3
Corporation of Birmingham*	24·20	·216	·051	·001	·206	·258	2·00	10·7
Corporation of Glasgow†	3·40	·168	0	0	·004	·604	·73	·7

* Analyzed by Dr. Alfred Hill, Medical Officer of Health and Analyst to the Borough.
† Analyzed by Dr. E. J. Mills, F.R.S., of the Andersonian University, Glasgow.

Note.—The numbers in the analytical table can be converted into grains per imperial gallon by multiplying them by seven, and then moving the decimal point one place to the left. The same operation transforms the hardness in the table into degrees of hardness on Clark's scale.

BRISTOL UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of Shareholders was held on the 13th inst.—Mr. F. TERRELL in the chair.

The SECRETARY (Mr. H. H. Townsend) submitted the following report of the directors:—

The accounts for the half year ended the 30th of June last show a balance to the credit of profit and loss account of £39,647 16s. 1d., out of which the directors have to provide for contingencies and for the payment of the usual dividend to the proprietors.

The directors feel pleased to be able to announce a further reduction of 3d. per 1000 feet in the price of gas to the consumers, to take effect from and after the 1st of July last.

The purchase of the land, on which to erect additional works at Stapleton, has been completed, and your engineer is now engaged in preparing plans for such portions of the work as will require to be commenced with the least possible delay.

The Act of Parliament for enabling the company to divert the existing public footpath through the purchased property, and for granting other powers, received the Royal Assent on the 12th of July last.

The sum of £10,000 capital stock in the company was sold by auction on the 22nd of June last, and realized a premium amounting to £10,512, which, in accordance with the Act of Parliament, is applicable to the general purposes of the company, but not entitled to dividend.

A considerable portion of the loan debt of the company has been converted into permanent 4 per cent. debenture stock, and it is not the present intention of the directors either to renew existing loans as the bonds become payable or to take up any further sums on loan or mortgage bonds.

Three of the directors retire at this meeting by rotation—viz., Mr. Lucas, Mr. Terrell, and Mr. Taylor; also one of the auditors, Mr. Thomas, the whole of whom are eligible for re-election.

The directors recommend that a dividend at the rate of 10 per cent. per annum on the capital of the company entitled to dividend be declared, and made payable at the bank of Messrs. Miles, Cave, Baillie, and Co., Bristol, on and after Saturday, the 29th of September inst., subject to the deduction of income-tax.

The CHAIRMAN, in moving the adoption of the report, remarked upon its favourable character. He thought that it had its usual merit of being brief, but it was *multum in parvo*. The statements there made respecting their finances, their present condition, and their future prospects were so good that it was scarcely necessary to say anything to induce the proprietors to receive and adopt the report. The prices realized at the sale of shares, when £10,000 worth were disposed of in something like half an hour or twenty-five minutes, showed, too, that the stock stood well with the public, and was sought after by those who had money to spare and wished a good investment for it. They had endeavoured to please the consumers by reducing the price of gas 3d. per 1000 feet, and they had also made a similar reduction in the price charged for the public lamps. Having then, he thought, pleased all classes of the community—looking, of course, first of all to their shareholders, as was their bounden duty to do—he ventured to predict that, in spite of petroleum and in spite of electric light, they would continue to be the flourishing company they were at the present time.

Mr. T. T. TAYLOR seconded the motion, and stated that with regard to the new works to be erected upon the land which had been purchased at Stapleton, the directors had given every consideration as to the best and most economical way of laying out that land for an additional supply of gas. He believed the company had always kept up with, or rather in advance of, the public demand for gas, and so long as they possessed a monopoly of supplying it to a large city like Bristol it was their duty to do so. There had never been any complaint, however, that they had been behind hand, and from present appearances he did not think there was likely to be for many years to come. He hoped they would continue to give the public as much gas as they required, and at such a pressure that they should not only supply it to every citizen, but give all as much as they required to burn. The high estimation in which the stock of the company stood in the market was very gratifying to the directors and all concerned.

Mr. SPARR, in reply to a suggestion by Mr. Giles, said that the directors on the previous day had determined that, for the future, the report should be printed and circulated preparatory to the meetings of shareholders.

Mr. GILES asked for an explanation of the item charged for parliamentary expenses to the amount of £1640. Presuming that it was for the passing of one unopposed Bill in which the company had been concerned during the past year, it appeared to him to be an unnecessarily large sum. Of course, it did not much affect the company whether it was £1600 or

£6000, but he would be glad to know that the directors were prudent and economical. He wished also to refer to the public lamps, observing that the income of the company from that source had been diminishing while the service had been increasing. He suggested that, instead of going on reducing the general price of gas from time to time, they should light the public lamps gratuitously. The proposal was, no doubt, apparently absurd, but he had made it in order to direct attention to the matter, and he pointed out that it would not make the slightest difference to the company, for it would simply result in their postponing the diminution of the charge made to the private consumers, and he wanted the rate-paying public to see the gas company had no interest in keeping up the charge for lighting the lamps. He observed that they had had one or two scares lately about the electric light, and this year it seemed to be on the increase, and had affected the price of gas stock; but really in the nature of things there was no possibility of the electric light becoming applicable for general purposes, for the reason above all things that there was no possibility of storing force, and if any accident happened the light would cease at once. When, however, they saw men like Dr. Stephenson taking the matter up there must be something in it, and though the light could not be made available for general purposes, it might possibly have its use for large public buildings.

The CHAIRMAN, in reply, said that if there should be any change in the lighting of the lamps, he thought one matter of regret would be that those who had the regulation of the lamps would lose all opportunity of finding fault, which would no doubt be a sore vexation. There would be a difficulty in dealing with the public lamps in the way suggested by Mr. Giles. He should be glad if they could come to some satisfactory arrangement with the sanitary authority, who were rather troublesome and meddlesome. The Bills which they had to carry through Parliament had not been unopposed.

Mr. J. NAISH asked the chairman whether he thought there was any prospect of petroleum interfering with the supply of gas.

The CHAIRMAN answered that he had very little to say on the subject, because, in fact, he knew very little about it, he could not tell what light they might be able to obtain from petroleum, in what quantity, and at what price. He thought, however, the citizens would find the use of petroleum more expensive, and that there would be much more difficulty in supplying lamps with it than with gas. He believed that at the present time petroleum was at a low price, and if a contract was made for lighting the public lamps with it, the price would go up to such an extent that it would be rather dear work for the city in future. That, however, was simply his opinion, and he could not say more about it than that he had no faith in it and no fear of it.

A SHAREHOLDER remarked that he knew a place which was lighted with petroleum, and the lamps had to be changed and cleaned every day, which involved an enormous amount of trouble and labour, and everyone must see that the cost of that would be enormous.

Mr. FIDDES, the engineer, gave it as the result of calculations which he had made in reference to the lighting of the public lamps at Winchester with benzoline that the cost for the oil would be 2½d. against 1$\frac{9}{10}$d. for gas. The last speaker had also drawn their attention to the difficulty of trimming the lamps. From the enormous amount of soot deposited they had to be cleaned every day, whereas they were now only cleaned twice a week. Neither need the shareholders be alarmed that the electric light would come into competition with gas. An experiment had been tried in France under the most favourable conditions, and it had been proved that they could not have a continuous light for longer than 45 minutes, and the light was 33 per cent. dearer than gas.

The report and accounts were unanimously adopted.

The CHAIRMAN moved that a dividend, at the rate of 10 per cent. per annum for the half year, subject to deductions of income-tax, be declared payable on and after the 29th of September.

Mr. T. T. TAYLOR seconded the motion, and it was carried.

Mr. J. D. WESTON moved the re-election of the retiring directors—Messrs. F. Terrell, T. T. Taylor, and J. Lucas. They were so well known to the shareholders, and possessed so much of their confidence, that he need say nothing except to express the pleasure which their colleagues would feel in their continuing to be members of the board. He observed, with regard to the most generous suggestion of Mr. Giles, that they should light the public lamps gratuitously, that, if the ratepayers were identical with the consumers of gas, probably there might not be much objection to the proposal; but, inasmuch as the ratepayers were not identical with the users of gas, the proposition certainly was untenable. The directors had recently purchased a site for the erection of very large works, and upon it a very large amount of capital would have to be expended. Mr. Giles appeared to have conceived the notion that they had very little to consider with regard to the expenditure, because, in the end, the results would come out very much the same. That was a doctrine which might be attended with very evil results. He might say that, rather in contrast with that, each director was animated with the desire to reduce the expenditure to the lowest point, and to economize in all their outlay. The shareholders might depend upon it that that feeling would animate the Board with regard to the new works, for, although the shareholders might still look forward to receiving their 10 per cent., it must be remembered that the lower the price of gas the greater was the security—so long as they had the margin for their dividend—for their continuing to pay that 10 per cent. The directors were animated with some public spirit, and they all felt a pleasure, second only to serving the shareholders, in being able to reduce the price of gas as often as might be possible, and their best exertions would be used to economize in every way even in that direction.

Mr. C. METIVIER seconded the motion, and it was carried.

On the motion of Mr. NAISH, Mr. George Thomas was re-elected auditor.

Mr. GILES said they had nine directors, and the amount of remuneration made to them was £800, which gave to each £88 17s. 9½d. per annum. They did not, of course, estimate their services at that rate, and it was not a rational amount, for it should be a sum capable of fair division, and leaving something in excess for the chairman and deputy-chairman. He proposed that the allowance be in future £1000 per annum.

Mr. ALLER seconded the proposition, and it was carried.

The CHAIRMAN, in acknowledging the resolution, said the directors received it as a token of the shareholders kindness and their continued confidence in the board.

A vote of thanks to the chairman terminated the proceedings.

GLASGOW WATER SUPPLY.—Dr. Mills, F.R.S., of the Andersonian University, Glasgow, reports that, during August, the water supplied to that city from Loch Katrine was very pale brown. It contained muddy particles and a slight amount of fibrous matter.

BIRMINGHAM WATER SUPPLY.—Dr. Hill, the Medical Officer of Health for Birmingham, reports that the water supplied to that town during August showed a slight increase in organic and other nitrogen, the former doubtless owing to defective filtration. It was turbid, greenish yellow, and contained infusoria.

CITY OF WATERFORD GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held on Monday, Sept. 3—Mr. JOHN H. SUGRUE in the chair.

The SECRETARY (Mr. D. J. Madden) having read the notice of meeting, the following report was presented:—

The directors have much pleasure in submitting the annexed statement of your accounts for the half year ending June 30, 1877. The revenue account shows a credit balance of £1142 0s. 5d., out of which they recommend a dividend at the maximum rate of 10 per cent. per annum—this will amount to £800—and out of the balance remaining it is proposed to place £200 to credit of the reserve-fund, and carry over £142 0s. 5d. to next account.

The directors beg to report that in compliance with the resolution of the shareholders at their meeting of the 13th of February, they proceeded with the Bill which had been lodged at the commencement of the session of Parliament, for the purpose of enlarging the capital powers of the company. To their great surprise the measure underwent fierce opposition from the Corporation of Waterford. Not satisfied with contesting it for two days before the Select Committee of the House of Commons, they even opposed it in the subsequent formal stages in the House itself. When the Bill reached the Lords the opposition developed itself with increased pertinacity, and the committee of that House had the Bill before them for three days. The directors are gratified at being able to announce that the opposition signally failed, and that it had the effect even of giving the company advantages they never contemplated. The Bill has become law, and, as it now stands, the financial circumstances and resources of the company are as follows:—

Old Capital—	
Old capital, on which 10 per cent. can be divided (A shares)	£16,000
Old loan capital, convertible into 10 per cent. shares, and divisible among shareholders	4,000
New Capital—	
Capitalized profit shares, bearing 5 per cent. dividend (B shares), divisible among shareholders	£2,000
New capital, with 7 per cent. dividend (C shares)	16,000
New loan capital	4,000
Total authorized capital	£42,000

A clause has also been introduced which has abolished the old system of unequal discounts, varying from 5 to 20 per cent., and a standard price of 5s. 9d. per 1000 has been fixed for the gas, with a uniform discount of 15 per cent., and this is accompanied by a provision for increasing or reducing the different authorized dividends, at the rate of 5s. per cent., as the price charged is 1d. per 1000 under or over the standard price. On this subject the directors have to inform you that in an early stage of the Bill they offered to fix the price at 5s. 6d., with a 12½ per cent. discount, without any sliding scale; the concession of the latter boon will now enable the company to disregard the consequences of a coal famine, and also to recoup themselves by increasing the standard price, should their dividends be in any way invaded. The corporation insisted in their opposition that the standard price should be 4s. 6d., with 15 per cent. discount.

It may be mentioned that under the clauses in the old Act which relate to public lighting, the company were at a great disadvantage, owing to the difficulty of obtaining the costs of arbitrations against the corporation. All these questions are now satisfactorily set at rest by the new Act. It should also be stated that the corporation have obtained power to purchase the works, subject to the future authority of Parliament. This is, however, limited to three years, and the price must be settled by arbitration.

Of this procedure the directors entertain no apprehension (in fact, they offered, for peace sake, a far less cumbrous and a more workable clause for the same purpose, previous to the contest in the House of Commons), as it is the rule for arbitrators to give companies possessing parliamentary powers an increased price for their works, as compared with companies without such powers, and seldom less than 25 years purchase of the profits earned. By the operation of the new Act, gas will now be supplied at 4s. 10½d. per 1000 to every class of consumers, a price which contrasts most favourably with other neighbouring towns—for instance, Clonmel, where 6s. 8d. and meter-rent are charged, and Kilkenny, where the price is 7s. 6d. per 1000.

After so bitter and almost unprecedented an opposition, it is needless to state that the company have been put to serious expense. It is, however, fortunate that the Act will enable the shareholders to be reimbursed this great outlay.

The directors have to mention that it will be their duty, at a later period of the year, to summon a special meeting of the proprietary, in order to consider the financial requirements of the company, and to meet them by an exercise of their newly acquired powers, which are ample enough to avert another application to Parliament for a very considerable period. Under a recent Standing Order, the Act has made it compulsory that the new shares shall be sold by auction or tender, and the premiums realized are to go to the credit of the concern.

Dr. *Revenue Account, for the Half Year ending June 30, 1877.* *Cr.*

George Anderson, for supply of gas, lamp-lighting, collection of rental, &c.	£2,575	1	7	Balance of profit last half year	£673	13	11
Thirty-sixth dividend on shares, declared in March, 1877, and paid	640	0	0	Rental of Lighting—			
Interest on mortgage debenture debt for six months, to May 1	95	16	9	Private lights	3,094	10	11
Office and ground rents	25	18	1	Public lights	826	17	8
Directors remuneration	25	0	0				
Secretary and accountant	20	0	0				
Audit	3	0	0				
Rates and taxes	1	4	0				
Interest on gasholder account, six months to June 30	31	5	0				
Advertising, printing, and stationery	6	18	6				
Law expenses	21	16	5				
Engineering	7	1	9				
Balance	1,142	0	5				
	£4,595	2	6		£4,595	2	6

Balance-Sheet.

Permanent investment	£26,914	3	2	Share capital	£16,000	0	0
George Anderson, balance due by him on account of revenue	692	11	4	Mortgage debenture	4,000	0	0
Investment Account—viz.:				Sundry creditors	87	7	5
Great Southern and Western Railway Company 4 per cent. preference stock	311	6	3	Depreciation account	6,914	3	2
Cork, Blackrock, and Passage Railway Company debentures	750	0	0	Reserve-fund	1,091	16	8
Extension and improvement account	1,291	2	7	George Anderson, gasholder account	1,289	19	3
Parliamentary costs	886	9	0	Munster Bank, Limited	107	8	0
Corporation of Waterford	87	2	7	Revenue account	1,142	0	5
	£30,632	14	11		£30,632	14	11

The CHAIRMAN, in moving the adoption of the report, said the shareholders were all aware that for several years the company had been extending their business and increasing the capabilities of the works for the manufacture of gas by expenditure out of the profits. In other words, with a view of saving expense, not to themselves or to the shareholders, but to the consumers of gas in Waterford, they had spent year after year in Waterford money which they might have divided amongst themselves for dividend, and in the course of some 15 or 20 years that money so expended amounted to no less a sum than £6900 odd, which money should properly have come out of capital, if they had had capital. In consequence of this they were obliged last year to call the shareholders together, and on the 15th of February, as stated in the report, the directors were authorized to proceed with a Bill in Parliament, to enable them to get capital. Their sole object in going to Parliament for that Bill was to enable the company to carry on their works with advantage to the citizens of Waterford and the consumers of gas in that city; because, as far as the company were concerned, they were getting, and would continue to get, a very remunerative rate of dividend. But it became absolutely necessary to obtain power to increase their capital, and, accordingly, as

they were authorized, they went to Parliament asking for a very moderate increase of capital consistent with the business they had to do and the necessities of their trade, and they found themselves opposed by the Waterford Corporation. Before proceeding with the Bill they endeavoured to come to an arrangement with the Corporation of Waterford, and, in private conference, they offered advantageous terms as to the price of gas, and also to forego various advantages which were given now by gas enactments. The only matter which they disputed about, and which they did not agree to, was permission to allow them to capitalize, not £6900 of their own money which they had invested in the improvement of the works, but they asked to be allowed to capitalize £4000 out of that, and that was the simple question on which the Corporation of Waterford opposed them vehemently, and, he would add, most unmeaningly, in the House of Commons. Before the House of Commons they succeeded in having £2000 instead of £4000 capitalized for the company, which fact then caused them to regret that they did not ask for powers to capitalize the whole £6900, instead of £4000, because the directors found that their generosity in making a present of £2900 was not appreciated. Notwithstanding that, the company found themselves opposed in the House of Lords with the greatest bitterness, if he might use an expression which he thought he was justified in using, from the manner in which the opposition was carried on. He thought the words of the report conveyed the style of the opposition very fully. They were these: "Not satisfied with contesting it for two days before the Select Committee of the House of Commons, they even opposed it in the subsequent formal stages in the House itself." This was a course which he believed he might say, subject to the correction of Mr. Nagle, who had great experience in parliamentary matters, was a very unusual one to pursue. But the Corporation of Waterford opposed the Bill after it passed through committee, and the report added: "When the Bill reached the Lords the opposition developed itself with increased pertinacity, and the committee of that House had the Bill before them for three days." He was happy, however, to be able to tell the shareholders that they succeeded, with the exception of not being able to capitalize the amount he had spoken of, to the full extent of their expectations. They were now in a healthy position; they were in a position which would enable them to do now, and for the future, that which they had not been able to do since he had the honour of becoming chairman of the company—and that was, dividing amongst the shareholders their earnings. Previously, they had to act otherwise, and therefore it was that the directors were enabled to recommend a dividend of 10 per cent.; and the reason they were able to do this was, not because there was any increase in their consumption or their trade, but because they were not required to give any revenue to capital purposes. On that subject, he might say that the position of the shareholders was now a more comfortable and satisfactory one than it had been for a long time; the report, which spoke for itself, showed that. He would not go any further into questions which had arisen between the Corporation of Waterford—or rather, their advisers—and the company, because he thought it would not be germane to the subject. He only referred to it to show that it was not without a struggle that the directors had put the shareholders in the position they occupied to-day, so that they might carry out their business in Waterford independently, and divide amongst themselves the profits they had fairly earned.

Mr. P. Goold seconded the motion.

Mr. D. A. Nagle said a good deal of the trouble the company had had in Waterford arose from the corporation not having had the facts truly put before them. He knew many members of the corporation, and they were very calm-judging, prudent, excellent men, but unfortunately this business had been turned into the hands of a few people who, through malignity, stupidity, or otherwise had hampered the company's Bill, greatly to the detriment of the public at large. He would deal with a statement in one of the Waterford papers, which impugned a paragraph in the report. The paragraph said: "The directors then launch out into abuse of the corporation for defending the rights of the gas consumers, and blame it for opposing in the House of Lords, which arose from the insincere conduct of the company after the agents of the corporation had retired from the committee of the Commons. They say the company offered 5s. 6d., less 12½ per cent., equal to 4s. 10d., and if they were sincere why did they not insert it in the committee of the Commons? The price they inserted was 6s., less 15 per cent., equal to 5s. 1d." Now, he assured the meeting that the company did not go into the House of Commons at all until the month of June, and, to use a rather popular phrase, they "would be surprised to hear" that on the 28th of May, 1877, before the Bill was heard in the House of Commons, a minute was entered in the book of the Waterford Corporation, to this effect:—"Read a letter from Holmes and Company as to employing senior counsel and a gas engineer before the House of Commons on the Gas Bill." That was a proper suggestion from the law agents, but what was the resolution moved and adopted on it? "Resolved—That until the Bill comes before the House of Lords, all further expense as to counsel and gas engineer be avoided." It was plain that they were determined not to allow any important opposition they could offer the company to be made before the committee of the House of Commons, but to reserve whatever opposition they could offer them for the House of Lords. Now, how could the company be taunted with insincerity. Another paragraph in the Waterford paper said the paragraph in the report was pure invention, which stated that the corporation insisted on their opposition that the standard price should be 4s. 6d., less 15 per cent. In the document prepared by the responsible advisers of the corporation, he found there was an amendment in the 23rd clause to make the price of gas 4s. 6d., with the 15 per cent. discount. Instead of that the company succeeded in getting 5s. 9d. as the standard price, and if by good chance they were one day able to bring their affairs to this position, that they could reduce their price to 4s. 6d., they would be able to divide 13 or 14 per cent. dividend under the sliding scale. The sliding scale meant that for every penny they cut off the 5s. 9d., the standard price, they were allowed an increase of 5s. per cent. on every dividend they struck. At the present price they divided 10 per cent., but if they made the price of gas 5s. 8d. per 1000 feet they could make the dividend £10 5s., and if they decreased the price further they could make the dividend £10 10s., and so on in proportion as they reduced the price of gas. This would be a great provision in gas companies Acts, because it would be a stimulus to the directors to increase the number of consumers, and a great satisfaction to the shareholders. As a humble shareholder he would ask the directors, consistently with fairness, to be conciliatory to the people of Waterford, yet not to flinch from their rights, but to recoup themselves for the great and serious outlay they had been put to in the conduct of their Bill.

Mr. Lamerte: The more you benefit the public you benefit the company.

Mr. Nagle: That is so.

Mr. Goold: It is an inducement to us to give gas at a cheap rate.

The report and statement of accounts were then adopted.

Mr. Lamerte moved that a dividend at the rate of 10 per cent. be declared on the share capital of the company.

Mr. Anderson, in seconding the motion, said he might say, as an old shareholder—as an original shareholder—that he was very happy to find that they had arrived at this condition at last. There was some difference between the company at the present day and the old company which they bought 17 years ago—a company which, at that time, the Corporation of Waterford were about to buy. Mr. Nagle and he went down to Waterford and determined to take up this concern, and having a better aptitude for these things than most people, they possessed themselves of the property. A company that had not paid a dividend for ten long years before, a company that had refused to give a single penny for extensions, and that was in a dilapidated condition, a company that had not supplied three-quarters of the town of Waterford with gas, came into their possession. On procuring ownership of it, they immediately laid down pipes in all the districts, although at the time the corporation of the day made it a bone of contention with them that pipes should not be laid in some districts. However, they laid their pipes, and they had prepared to put up lamps, but no applications for them came; and then they said to the people in the outskirts of the city, "Now you have got pipes, but we cannot give you light without permission of the corporation." Through the influences which the people of those districts could exercise, the lamps were put up, and they had been lighted since then. The old company paid no dividend—they charged 6s. 8d. per 1000 feet for gas. Their successors reduced the price as they could afford it, at the sacrifice of the dividend payable to the shareholders; they had expended money in the extension of the works, and they gave as good gas as they would find in other parts of Ireland. As a matter of fact, he had had compliments paid to him by gentlemen from other towns as to the quality of the gas in the city of Waterford. The gas was good, pure, and cheap, and it was because of that they were enabled to increase their business to the extent that the company were now in a position to pay the shareholders 10 per cent. They were enabled by their Act of Parliament to extend their business and expend several thousand pounds for the purposes of their business; but he believed, in view of matters now before them, they would be able to give a good dividend on that. As to the people of Waterford, as a body, including the corporation and the consumers outside, he had no fault to find. There were one or two individuals—he might almost say one, a talkative, ignorant individual. There were some gentlemen who could talk for an hour on nothing. The gentleman he referred to was one of the kind. Go into a place where a gentleman speaks for an hour and says nothing, and one was at a loss to know what to think of it; but go into a place where in five minutes a man said something—that was, something that one could take away with him, and where an idea was struck—and then there was some satisfaction. But, in the opposition given to them in Waterford, no idea was struck. Your respectable, calm, thinking man was not an individual afflicted with the dreadful amount of talk that others were afflicted with, and who endeavoured to override people by what ended in nothing. As to the opposition encountered by the company, it was the same as occurred when they went to Parliament in 1858. They had then to expend £2000 in law expenses, which would have been a great deal better for the people at Waterford if it had been expended in bricks and mortar. If the latter appropriation of the money occurred, the people would benefit by it, because they would have £2000 less to pay 10 per cent. on. At that time it was very difficult for them to find capital, as some of their old shareholders could testify. They offered the shares to the people of Waterford. and so great was the difficulty experienced, that it was only by applying to their friends, who had confidence in them, that they were placed in the position they now occupied. He thought they had a right to thank each other for arriving at that position—he hoped they would long continue in it, and he believed they would. They had a good and increasing property, and they were increasing their capital accordingly, for they would have business to meet it. All things considered, he declared that, come what might, they were in a good position; they were prepared to deal amicably with everybody, but they were prepared to fight with anybody who had any fight in them.

Mr. Lamerte endorsed from experience everything that was said respecting the illuminating power of the gas in Waterford.

The Chairman said that several of the Waterford gentlemen who opposed the Bill, when examined before the House of Commons, gave as the burden of their song that, though they had no confidence in the company, they had no fault to find with the gas. In respect to that Mr. Nagle would bear him out. He thought they might be satisfied that, both as to the quality of the gas and the way the work was done, there was no fault found by either shareholders or consumers.

The motion was put and carried.

Mr. Nagle said he felt that he ought to bear his testimony to the great exertions of the chairman, and the importance of the work which he accomplished while the Bill was before Parliament. He thought the success that attended their Bill would not have been secured but for the attention which the chairman gave to it through all its stages. He need not, in the chairman's presence, speak of his practical ability, his energy, and his aptitude for business. All his abilities were placed at the disposal of the committee, and he was bound to say that Mr. Sugrue's exertions materially helped the passage of the Bill. Nothing that the meeting could do would be commensurate with the gratitude that the shareholders owed Mr. Sugrue.

On the motion of Mr. Lamerte, seconded by Mr. Anderson, and supported by Mr. Goold, a cordial vote of thanks was given to Mr. Sugrue for his valuable services.

The Chairman, in acknowledging the vote, said it was a very gratifying one to him. He did throw himself heart and soul into this matter. He was one of those who, when he undertook to do a thing, was determined to carry it out irrespective of personal loss. He had only lost his time, and that he had willingly placed at the disposal of the shareholders.

Mr. Anderson drew attention to the insufficient salary paid to the secretary, Mr. Madden, and, after a short conversation,

Mr. Sugrue said, it was only necessary to have the matter mentioned to ensure the attention of the directors to it.

The proceedings then terminated.

Quality of the Newcastle-on-Tyne Gas.—Mr. John Pattinson reports as the results of his examinations, for the month of August, of the quality of the gas supplied to the borough by the Newcastle-upon-Tyne and Gateshead Gas Company:—

Date.	Illuminating Power in Sperm Candles.	Grains of Sulphur in 100 Cubic Feet of Gas.	Sulphuretted Hydrogen.
Aug. 3	14·0	8·97	Nil.
„ 7	14·4	8·27	„
„ 10	13·9	8·77	„
„ 14	13·8	6·93	„
„ 17	13·8	7·41	„
„ 21	14·9	6·36	„
„ 24	14·1	6·10	„
„ 28	13·8	5·99	„
„ 31	13·3	5·52	„

A Sugg-Letheby standard Argand burner is used in testing. According to Act of Parliament, the gas should not be of less than 14 standard candles illuminating power, nor contain more than 17 grains of sulphur per 100 cubic feet of gas.

CANTERBURY GAS AND WATER COMPANY.

The Half-Yearly Meeting of this company was held on the 7th inst.—the MAYOR (Mr. Linom) in the chair.

The following report was presented:—

The gas and water rentals in the company's district are steadily increasing. Your directors have much pleasure in referring to the fact that the prosperous condition of the company's affairs has enabled them to reduce the price of gas, from the 1st of April last, to 3s. 9d. per 1000 cubic feet.

The extensions and renewals of the gas plant referred to in a former report to the shareholders, consisting of a new telescopic gasholder, and an enlarged retort-house, in the old Castle precincts, are now being executed under the superintendence of the company's consulting engineer, Mr. Robert Jones, of the Commercial Gas Company. The cost of these works will be defrayed principally from the fund which has been set apart for the purpose.

In accordance with the resolution passed at the special general meeting of the shareholders in April last, your directors proceeded to allot, as far as possible, the shares authorized to be raised for payment of the loan capital, and there remained 127 unallotted shares, which were sold by auction at prices which your directors feel must satisfy the shareholders of the high value of their property which is entertained by the public. The premium on these shares will be applied, for the benefit of the company's works, as occasion may arise, in conformity with the terms of the Act of Parliament.

The balance standing to the credit of the profit and loss account is £2801 5s. 4d., and your directors are therefore enabled to recommend that the maximum dividend, after the rate of 8 per cent. for the half year, be declared, and paid on and after Monday, the 2nd of September.

The CHAIRMAN, in moving the adoption of the report, said there were one or two things in reference to it to which he would wish to allude, and the first related to the reduction in the price of gas. That reduction must be satisfactory, he thought, not only to the shareholders, but to the consumers as well; it was satisfactory to the former, since it showed the company were in a position to take such a step; and, as a matter of course, the consumers did not object to it. He believed he might take it for granted there were few towns or cities where gas was supplied at a less rate than they were now doing—namely, 3s. 9d. per 1000 feet. Respecting the extension and renewals of the gas plant, mentioned in the report, they could easily see for themselves what was being done, in the construction of a new telescopic gasholder and an enlarged retort-house. When finished, these works would bear comparison with any in the county, and the cost of them would be defrayed principally out of the fund set apart for that purpose. In accordance with a resolution of the shareholders, additional shares had been allotted, to the satisfaction, he hoped, both of the shareholders and the public. The directors were able to recommend that a dividend at the rate of 8 per cent. for the half year be declared, and he saw no reason why they should not continue to do so in future years.

Major CASTLE seconded the motion.

Mr. DANCE contended that the *pro ratâ* principle, which had been adopted in the allotment of the additional shares, was not equitable. He could never believe it was the intention of the Legislature that under the Act, which the directors said sanctioned the course they had taken, such a distribution of shares as that should be made. Whenever there was any doubt as to the meaning of an Act, the course was always to ascertain the mind of the Legislature when the Act was passed. He could not imagine any one would have the hardihood—he hoped the word was not too strong—to maintain that the distinction which had been set up between the large and small shareholders was right; he was certain such a view was never entertained by the Legislature. On turning to the 29th clause, which was the chief one in the Act, they found it put first and foremost that when they wanted to raise new shares, they must be sent into the market and disposed of by public auction. If that had been done in this case, there would have been no dispute; but as it was, the directors drew an invidious distinction between the large and small shareholders, and the latter felt themselves aggrieved because, they contended, the *pro ratâ* principle had not been carried out in its integrity. The sentiments he had just expressed had been publicly uttered, and he had only to repeat that they (the small shareholders) had been placed in a very unfavourable position. They were liable for any loss which might take place, and, therefore, they ought to have a fair share in any privileges which there might be.

The CHAIRMAN said that as for the number of small shareholders who were aggrieved at the distribution, if his memory served him right, there were only three who spoke against the action of the directors at the meeting. If there were so many aggrieved, he was surprised they were not present to vote against the proposal. The Act justified what they had done, and if they had not satisfied every one, they had tried to do so, and he was sorry they had failed.

Alderman HART said he did not altogether approve of what had been done by the *pro ratâ* scheme, but he was told by the secretary that it was according to law, and he did not see what else they could do. In another company with which he was connected, the small shareholders put their shares together, and thus, by temporarily transferring them, they got the benefit of any new capital distributed *pro ratâ* amongst the shareholders. That, however, was for the small shareholders themselves to do, and had they in the present instance come before the directors and asked permission to do so, it might perhaps have been granted.

Mr. RAYNER remarked that the directors did not come to the conclusion to take that course without a great deal of consideration; they duly weighed the matter over, and one and all agreed they had no other resource because that was the legal one.

The resolution was then carried, and, on the motion of the CHAIRMAN, seconded by Alderman HART, a dividend for the half year at the rate of 8 per cent. was ordered to be declared and paid.

A vote of thanks to the directors terminated the proceedings.

FALMOUTH GAS, COAL, AND COKE COMPANY, LIMITED.

The Annual Meeting of Shareholders was held at the Company's Offices, Falmouth, on Friday, Sept. 7, under the presidency of R. M. TWEEDY, Esq., chairman of the board of directors.

The SECRETARY (Mr. R. J. Lukey) having read the advertisement convening the meeting, and sealed the register of members, the following report of the directors was taken as read:—

The directors are gratified at being in a position to place before the shareholders a statement of accounts which shows that this company is just entering on that state of prosperity enjoyed by most large and old established gas-works. As anticipated in last year's report, the improved state of the works, the careful examination of the mains, and stoppage of leaks, have made a marked difference on the profit for the year.

Your manager has again devoted a considerable amount of attention during this summer to the inspection and repairs of the mains and services; about 1150 yards of new mains of various sizes having been laid, some in the place of those which were found defective, and others as extensions.

The leakage amounts to 13·4 per cent., being a decrease of about 9 per cent. as compared with last year, and 12 per cent. less than the previous one.

The profit on the year's working amounts to £1291 11s. 5d., from which it is proposed to pay a dividend to the shareholders of 10 per cent. (free of income-tax), which will absorb £1076 10s., and to transfer the balance of £215 1s. 5d. to the suspense account.

A vacancy having occurred in the auditorship by the decease of Mr. W. Phillips, in March last, an extraordinary general meeting of shareholders was called, in accordance with the provisions of the Articles of Association, for the purpose of appointing an auditor in his place, at which meeting Mr. H. J. Coward, jun., was elected.

Messrs. R. M. Tweedy, W. H. Thomas, and W. S. Olver, three of your directors, retire by rotation, but offer themselves for re-election.

The auditors, Messrs. W. H. Williams and H. J. Coward, jun., retire, but offer themselves for re-election.

The CHAIRMAN, in moving the adoption of the report, congratulated the shareholders on the company now being in a most prosperous state. They had not suffered, as was predicted a year or two since, from the introduction of petroleum lamps, which were tried in the place and failed; and he did not think they would be injured by the electric candle superseding gas, for the candles would not last more than half an hour without being replenished, which was an expensive trouble that they would not be likely to undertake, even in a small place like Falmouth. They were able to pay a dividend of 10 per cent. that year, and if they were a company working under an Act of Parliament, that would be the highest sum they would be able to pay; but as they were not so working, with larger profits they would have even greater dividends. Having arrived at such a state of prosperity, they would be able to complete the improvements in their works throughout the district, and, being able to hold out inducements for the consumption of more gas, they would get greater profits. During the year they had laid new mains and repaired old ones, and it was a great source of gratification to the directors to find their leakage reduced to 13·4 per cent. Some few years ago it was 25 per cent., but now it was reduced to a small quantity, considering the production of the company, and the fact that they were supplying gas to a district with such uneven levels. In the past year they had made 33,200 feet less of gas, while there had been an increased consumption of 1,581,300 feet, and a reduction in the leakage of 1,614,500 feet. The company were established in 1866, and paid no dividend for some time. Then for four years they paid 2½ per cent., for three years 5 per cent., for two years 6¼ per cent., in 1876 7½ per cent., and this year 10 per cent. All these figures gave an average of 4¾ per cent. for the time the money had been invested, and he thought the consumers would think they were entitled to have a 10 per cent. dividend for a few years more before they were asked to make any large reduction in the price of gas. At present, while at Falmouth they charged 4s. 6d. per 1000 to all consumers, at Truro and Redruth that sum was charged to large customers only.

Mr. N. FOX seconded the motion, which was carried, as was another declaring a dividend of 10 per cent.

Mr. R. R. BROAD moved the confirmation of the following resolution, passed at the last annual meeting:—"That the directors be paid for their future services at the rate of 10 per cent. on the amount of the profits divided amongst the shareholders." For ten years the directors had no remuneration, but having done their work so well, and brought the company into such an efficient condition, they ought to be remunerated for their trouble.

Mr. H. POLLARD seconded the motion.

Mr. T. R. OLVER, on behalf of an absent shareholder, while not objecting to see the directors paid, thought 10 per cent. on the profits too much to ask for. At Truro the managing directors only had £40 divided amongst them, and he thought, seeing that the company had as yet only paid an average of 4¾ per cent., that it was too much to ask them to pay the directors. He thought seven directors too many to manage such a small concern, and instead of giving 10 per cent. to them, he would give the consumers the benefit of their improved position.

Mr. A. WILLMORE would rather see it proposed to pay the directors in a lump sum.

Mr. BROAD said he considered a per centage of profit the best, as, if they should cease to pay dividends, then the payments to directors would cease.

The motion was carried unanimously.

Messrs. R. M. Tweedy, W. H. Thomas, and W. S. Olver were re-elected directors; and Messrs. W. H. Williams and H. J. Coward, jun., were re-elected auditors.

The manager (Mr. F. M. Harris) was accorded a vote of thanks, and a bonus of £20 was voted to him for his valuable services.

A vote of thanks to the chairman concluded the proceedings.

HASTINGS AND ST. LEONARDS GAS COMPANY.

The Ordinary General Meeting of Shareholders was held on Thursday the 6th inst.—Mr. J. ROCK, the deputy-chairman, presiding.

The report of the directors, which was taken as read, stated that new mains had been laid and old services replaced, to a total cost of £1030 10s. during the year; and that the increased consumption of gas had rendered it necessary to enlarge the new holder next spring. To meet the cost, the directors proposed to make a call of £4 per share on those not fully paid up. The accounts showed a total balance of £6349 14s. 11d., out of which it was intended to pay the statutory amount of dividend at 10, 7, and 5 per cent.; also to pay a bonus of £1 5s. per share on the £25 old shares. A balance of £537 4s. 11d. would remain to be carried forward.

The CHAIRMAN, in moving the adoption of the report and the declaration of the dividends and bonus, remarked that the report called for but few observations, and the small attendance of shareholders testified that, as a body, they were satisfied with the conduct of their directors. The directors were about to make a very considerable outlay in extending their means of storeage, by doubling the capacity of their last new holder, which had been prepared for that purpose when erected. The directors had deliberated over this arrangement, and taken everything into consideration, and they were of opinion that the expense of doubling the present holder would be less than making a new one. This expense, of course, would necessitate the calling up of a further amount of capital, and in some measure affect the amount of dividend on the proportionate capital advanced. As to the condition of the works, he advised those present to go round them. They would see that there was a large stock of coal in the yard, and that, of course, had absorbed a considerable amount of money. There was also little coke, and that was all the better for the shareholders.

Mr. JENNER seconded the motion, which was carried.

Messrs. J. Brown, E. Hayles, and N. Parks were re-elected directors, and Mr. Hallaway was re-elected auditor. Resolutions were also passed increasing the remuneration of the auditors from 10 to 15 guineas, and making an addition of £50 to the salary of the secretary.

Mr. WALDER said he should like to have heard from the chairman some hint that they had an idea of reducing the price of gas to consumers. As a small shareholder, he was, of course, pleased to find that the company were so successful, but he really thought that the consumers should be studied as well as the shareholders. There was considerable agitation out of doors over the question, and consumers would be apt to agree with the agitators. Seeing that there was a good dividend to the shareholders, and, as the chairman had stated, they had a large stock of coal, he thought some reduction might be made. All these things had caused, as he had said, some agitation, and as he was intimately associated with those who agitated, he should like to hear some expression of hope held out. These things gave the people a chance to say—and with some sense, too—that the interests of the consumers were not studied. He hoped to hear, for the benefit of consumers generally, that a reduction in the price was possible.

Mr. HALLETT said he had had some experience in London of the results of agitation for cheap gas, and these results he would give the meeting. He was living in a district where they had been paying 6s. 3d. per 1000 feet for gas from good cannel coal, and they all felt perfectly satisfied. Their furniture was kept in good order, their pictures were not tarnished,

and dust was not all-powerful. But a party in their parish got up an agitation, had the price reduced to 4s. 9d. per 1000 feet, and after the reduction he found his gas bill was very much higher. Somehow he burned more gas. When the collector called and he put the question to him, the collector said, "You wanted cheap gas, and you have got it. So much for the results of agitation." These were his experiences of the fruits of agitating for cheap gas, and he did not wish more of it.

The CHAIRMAN said the question put by Mr. Walder was a proper one, for it was evident that the directors must look to the interest of the consumers as well as their own shareholders. With regard to lowering the price, the directors could not at present see their way, as they were about making an outlay, and it would be well that they should not be too hasty in reducing the price. With this large outlay in prospect, they wanted to see their way through that job first; and then they might be able to see their way to the point very properly brought before them by Mr. Walder. As to gas being superseded by electricity, he had made some inquiries, as also had Mr. Wood, their manager. The question had occupied several scientific men in France and Germany, as well as in their own country, and the general conclusion arrived at was that there was no chance of electricity superseding gas for general purposes. The German scientists had gone into figures to prove that, commercially, the cost would be too great. They were not yet prepared to accord to it favourable mention for general purposes. With respect to the question of profits and dividends, consumers must look outside, and observe the very large consumption of paraffin and other oils as means of lighting, and judge by that that gas companies had not even the monopoly they had a few years ago. Their consumption was not so great as it might be. As to cheap gas, it was evident that gas should be of as good quality as possible, and consumers would do well to insist more on quality than cheapness. The directors did all they knew to preserve and improve the quality of the gas; and, considering the quality supplied to the consumer, and the dividend given to the shareholders, he thought there was very little to grumble at.

Mr. WOOD (the manager) said the question of lighting by electricity had been studied by him, as he had studied all projects for producing artificial light. There had been only one exhibition of the electric light held in England, and the attempt to produce light by that means for general purposes had utterly failed. He thought gas shareholders had no reason to be timid of the result of lighting by electricity, for all attempts yet tried had been failures. Still there was a marked difference between the electric light and what was known as the electric candle. The advantage for general purposes was in favour of the candle. The electric light was available for lighting up a given area, such as the dome of St. Paul's, the Westminster Tower, or Leicester Square; but that light was not divisible like gas. The electric light must issue at one point, and at that point they had a brilliant light, something like 80 per cent. more than they wanted. The electric candle met the case of divisibility in some measure. A Russian scientific gentleman—M. Jablochkoff—had, it was said, devised a means of dividing the electric current. He said he could divide it into 50 different currents, and he had actually divided it into eight points. But he had not yet managed the 50 points. There was this objection to the electric candle for domestic use. It consisted of two sticks of carbon, with a piece of porcelain — called kaolin — fixed between them. The kaolin sometimes guttered down, and the light did not remain steady, therefore it was utterly unfit for domestic use. In addition to this, it also threw off certain particles of silex, which was excessively irritating to all the respiratory organs. Another, and a formidable objection to the electric candle, was that it could not be made to burn half an hour; it had actually never yet burnt longer than 20 minutes, and after that time all the kaolin points must be changed. They would thus require to have another servant in their houses, to run about and change their candles every half hour. And again, the expense of these candles was very great. But there was this to be said in favour of electricity as compared with all other artificial means of lighting. Electricity was a great force of nature brought under the control of human agency. It was not a manufactured article like other means of artificial lighting. No mines had to be dug, no oil wells sunk, to obtain electricity. Still there was the disadvantage of its want of divisibility. In gas lighting they had only to run a pipe, and affix burners, and they had as many points of light as they chose. They could not yet do that with electricity; but, of course, it was impossible to say what science might effect. The telegraphic system was of slow growth, but had resulted in immense benefits. Still, after all, shareholders in gas companies had no reason to be timid of the new artificial light. He then concluded by referring to the risky character of gas companies, and said a 10 per cent. dividend to the shareholders was only right and just, and he hoped the directors would still be able to continue to pay it.

ROCHDALE CORPORATION GAS-WORKS.

MR. NEWBIGGING'S REPORT UPON THE PROPOSED ENLARGEMENTS.

At the Meeting of the Rochdale Town Council, on Thursday, the 6th inst., the minutes of the Gas Committee were submitted. They contained the following report from Mr. T. Newbigging, who had been called in to examine and report upon the extent to which the present gas-works could be enlarged if necessary:—

"5, *Norfolk Street Manchester, Aug.* 29, 1877.

"*To the Gas Committee of the Corporation of Rochdale.*

"Gentlemen,—At your meeting on the 9th inst., which I had the honour to attend at your request, you submitted to my judgment the question as to how much gas can be produced and stored, beyond the present make, on the site of the gas-works in Dane Street; having in view that certain of the existing buildings may be removed from their present position and re-erected on the land contiguous to the easterly boundary, and also that such adjoining land might be made available for the storeage of coal and coke.

"I have given full and careful consideration to the question.

"In submitting my conclusions to you, I will first of all determine how much storeage capacity for gas, beyond that which at present exists, can be provided upon the site without disturbing the existing arrangements in such a way as to entail an unreasonable or undesirable expenditure; and, secondly, I will show in what manner the manufacturing and purifying capabilities may best be extended, to furnish gas for such additional storeage capacity.

"You have at present four gasholders, which, on block plan A, accompanying this report, and representing the works as they are, I have numbered 1, 2, 3, 4, respectively. The available storeage or working capacity of these vessels is as follows:—

No. 1 gasholder	. . . . .	450,000 cubic feet.
2	"	180,000 "
3	"	360,000 "
4	"	620,000 "
Total working capacity	. . . .	1,610,000 cubic feet.

"The holder and tank marked No. 2 are the oldest, the holder itself is also the smallest on the premises. They occupy a portion of a site the whole of which might be utilized for the construction of a tank 133 feet in diameter, and 30 feet in depth, which would contain a two-lift telescopic holder 130 feet in diameter, and 60 feet in height.

"The position of such a tank and holder I have indicated on plans B and C.

"By demolishing a portion of the oxide shed on the southerly end of the premises, a further tank, 125 feet in diameter and 30 feet deep, may be constructed on the site; which would be capable of containing a two-lift telescopic holder, 122 feet in diameter and 60 feet high. This I have also shown on plans B and C.

"If these suggested extensions were carried out, the site would be fully utilized so far as regards tank space.

"The gasholder capacity would then stand as in the plans B and C, the several vessels thereon being numbered 1, 2, 3, 4, 5, and the available storeage or working capacity would be—

No. 1 gasholder	. . . . .	450,000 cubic feet.
2	"	760,000 "
3	"	360,000 "
4	"	620,000 "
5	"	670,000 "
Total working capacity	. . . .	2,860,000 cubic feet.

"This total of 2,860,000 cubic feet is the maximum storeage room for gas that can be provided on your present site, without resorting to the use of three-lift holders, which I do not care to recommend.

"The storeage thus obtained, beyond that which you now have, is 1,250,000 cubic feet, or an increase equal to 78 per cent.

"The working storeage capacity for gas in a manufacturing town like Rochdale should not be less than eight-ninths of the normal maximum producing power of one day (24 hours). Anything short of that would not be compatible with safety and economy in working.

"If the storeage be reckoned as eight-ninths of the production, this will admit of a daily (24 hours) maximum make of, say, 3,220,000 cubic feet.

"Your average make of gas per mouthpiece per diem (24 hours) is about 4600 cubic feet, and dividing the former figures by the latter, we have—

$$4{,}600 = \frac{3{,}220{,}000 \text{ cubic feet.}}{700, \text{ as the number of mouthpieces required to produce that quantity of gas per day.}}$$

"I should anticipate, however, that by your adopting through retorts, and improving the method of setting, so as to augment the heats, an increase of 10 per cent. on the present make per mouthpiece might be obtained, using your present quality of coal and cannel, which would reduce the number to 636.

"But it is necessary that there should be provided a surplus of retorts for use in case of emergency; and if 10 per cent., which is the usual margin, be added to the above, we shall have a total of 700 mouthpieces required.

"The existing number of mouthpieces, inclusive of the three double ovens in course of erection, is 350. This, deducted from the 700, leaves 350, for which provision in the way of retort-house extension would have to be made.

"The extension of the present house to the boundary of the gas-yard at the southerly end of the works, which you have already determined upon, will afford space for 84 of that number—viz., 6 double ovens, containing 42 through retorts; and these will be capable of producing 420,000 cubic feet in 24 hours, or 28 per cent. of your present production.

"For the remaining 266 mouthpieces, representing 133 through retorts, a new house will be required.

"There is no room for such a retort-house on the present site except by demolishing a portion of the buildings erected along the easterly boundary, and the old offices (already decided to be removed) on the northerly side.

"Consonant with these views, I present two different schemes, both perfectly feasible, and capable of being carried out. These are exhibited on the plans, marked respectively B and C, accompanying this report. The parts coloured red indicate the additional works.

"On plan B I have shown the position which, according to one arrangement, the new retort-house might occupy. This is placed at right angles to the existing house, and extends to the boundary of the site, being divided into two lengths, measuring each 111 feet long, and 60 feet wide inside; together capable of containing 20 double ovens set with 7 through retorts, or 280 mouthpieces in all. This number of retorts is seven in excess of what I have calculated above as being necessary, but it is done to make the two divisions of the house uniform.

"A covered store for coal, capable of containing 4000 tons, is shown upon the adjoining land. This amount of coal storeage added to your present capacity, and the additional room you will obtain by the extension of the existing retort-house—together, say, 11,000 tons—gives a total of 15,000 tons, being equal to 46 days stock, reckoned upon the maximum daily consumption, which would be ample for your requirements.

"The present condensing, exhausting, scrubbing, and purifying apparatus, and the buildings requisite to contain such of these as are required to be enclosed, are set out in the positions shown on plans B and C—viz., the condensers and scrubbers are duplicated near to the existing apparatus; the boiler-house is extended laterally; the exhauster-house is lengthened so as to be about double in size; and a new purifying-house is placed nearly opposite to your last new one, and adjoining the proposed new retort-house. This new purifying-house will contain six purifiers, 30 feet square each. It would be constructed on a plan similar to your present one; and the space underneath would be used for the revivification of the oxide of iron, whilst the lime could be manipulated in the shed extending to the front boundary wall.

"As regards the workshops removed to make room for the new retort-house, these I have shown as re-erected on a new plot, behind the present boiler-house, for convenience as regards the steam power that might be wanted.

"The new plot also affords very ample yard space for the storeage of coke, and an entrance gate could be provided as shown, by which separate access, if thought desirable, could be had into the coke-yard, with the subsidiary office and weighing machine adjacent.

"By the second scheme, shown on plan C, the retort-house is arranged parallel to the present one, 221 feet long, and 64 feet wide, inside measure, capable of containing 19 double ovens, set with 7 through retorts each, or a total of 266 mouthpieces.

"In this case the coal-stores are ranged on each side of the retort-house, one on the present yard, and the other on the new plot. They are each 221 feet long on an average, and 24 feet wide, and will contain 4000 tons of coal, making, with your present and contemplated storeage, 15,000 tons, or 46 days stock of the maximum daily (24 hours) consumption.

"The purifying-house I have placed at the southerly end of the yard. This will hold six purifiers, 32 feet long by 28 feet wide.

"The other apparatus is all shown as on the plan B already described.

"Either plan, in my opinion, could be carried out; but that marked B causes the least disturbance to existing arrangements.

"Summarizing my conclusions, I have shown, in answer to the question propounded to me, that the quantity of gas that can be produced and stored, beyond the present make, on the site of the works in Dane Street,

using the additional land on the easterly side for the storeage of coal and coke, and the erection of certain stores and offices, is a follows:—Present maximum make in 24 hours, 1,497,000 cubic feet; possible maximum make in 24 hours, 3,220,000 cubic feet; difference, increase, 1,723,000 cubic feet, or 115 per cent. Present gas storeage capacity, 1,610,000 cubic feet; possible gas storeage capacity, 2,870,000 cubic feet; difference, increase, 1,250,000 cubic feet, or 78 per cent.

"Either plan, if adopted, will entail an expenditure of about £65,000 for building and apparatus.

"I shall be happy to wait on you to offer any further explanation you may consider necessary. (Signed) "THOMAS NEWBIGGING."

The committee had passed the following minute relating to the above:—

"Having considered a report of Mr. Newbigging as to the extent to which gas can be produced (beyond the present make) on the site of the gas-works in Dane Street, and such report, asserting that the production of gas on such works can be doubled: Resolved, that the committee recommend to the council that no steps be taken for acquiring a new site for gas-works. Resolved, that a copy of Mr. Newbigging's report be sent to every member of the council."

On the motion for approving the minutes, a long discussion arose, and an amendment was moved excepting so much of the committee's recommendation that no steps be taken to secure the new land, and instructing the committee to get a report from Mr. Newbigging as to the desirability or otherwise of further extensions taking place on the land already scheduled. The result of the voting, however, was in favour of the course recommended by the committee by 15 votes to 13.

THE SULPHUR QUESTION AT MAIDSTONE.

At the Meeting of the Maidstone Local Board of Health on Wednesday, the 4th inst.,

The CLERK (Mr. E. Hoar) read the following report made by Mr. John West, the manager of the gas-works, to the directors of the company, and forwarded by them to the local board. The report originated out of complaints recently made by Mr. Adams, the local gas analyst, that the gas supplied by the company contained an excessive amount of sulphur compounds:—

To the Chairman and Directors of the Maidstone Gas Company.
Maidstone Gas-Works, July 20, 1877.

Gentlemen—In compliance with your request, I now report to you upon the question of the "sulphur compounds," and have also taken into consideration the remarks made by members of the Maidstone Local Board on Wednesday, the 27th of June last.

About 27 years ago, it was discovered that coal gas, as delivered to the public (although quite free from sulphuretted hydrogen), contained other sulphur compounds which were not removable by then known methods of purification; and about the year 1860, the Legislature, at the instigation of some persons, advising without sufficient knowledge, put a restriction upon some of the London gas companies, that they should not have more than 20, and in some cases 30 grains of these compounds in 100 cubic feet of gas.

Difficulties speedily arose, and efforts had therefore to be made to remove them, but only with partial success, and even up to the present time their removal can only be partially effected, at great expense, and by the use of sulphide of calcium, placed in extra purifiers especially arranged for the purpose.

The use of this material causes a great nuisance in the neighbourhood of the gas-works, and the result of this has been that some of those companies which have been trying their utmost to comply with their obligations have been indicted by local authorities for causing a nuisance. The liabilities to which they were exposed induced the Crystal Palace District Gas Company and The Gaslight and Coke Company to apply to Parliament during this session, in order to get relieved from the stringent clauses relating to sulphur compounds in their Acts of Parliament, and the evidence given on that occasion by the chemists, who are alike the most eminent of the day and the most experienced in respect to coal gas, has gone to prove that a quantity of these compounds, up to about 35 or even 40 grains in 100 cubic feet, is not injurious to health, and that a partial removal (which only is possible) is not worth the trouble and expense incurred.

Dr. Odling, professor of chemistry, and one of the late London Gas Referees, has given the subject his consideration for upwards of 20 years, and now positively asserts, after making a series of experiments (in conjunction with Dr. W. J. Russell) upon a large scale, that the sulphur compounds in gas in ordinary quantity are not injurious to health. Mr. Vernon Harcourt, one of the present Referees, and Mr. Thomas William Keates, Gas Examiner to the Metropolitan Board of Works, also gave evidence which tended to express a similar conviction, and Mr. Keates said that 30 grains might be allowed, so that little or no nuisance would arise in purification.

Our present system of purification is by the use of peroxide of iron for removing the sulphuretted hydrogen, and lime for the carbonic acid, and this system is almost universally adopted both in England and on the Continent; and in England we find, after this process is completed, that there is found in the gas from 25 to 45 grains of what we call irremoveable "sulphur compounds."

You are aware that I have had a very small per centage of these sulphur compounds in the gas, and that without using special means in purification. According to Mr. Adams's, the chemical analyst's, report I have been as low as 13 grains, and the average of his reports only show the quantity to have been about 23 grains. This great reduction in the sulphur compounds, I believe, is entirely due to my improved system of carbonizing coals. The increase during the last few weeks is due to the alterations going on in the works, and the use of some coals which have a very large per centage of pyrites.

Very much has been said about the evil effects arising from the combustion of coal gas which contains "sulphur compounds other than sulphuretted hydrogen," but up to the present time no proofs have been adduced in support of the assertions; on the contrary, the men best qualified to form an opinion, as already stated, give no credence to the assertion. The fact is, the quantity of sulphur compounds is too small to do any harm.

The subject, however, is placed before the public in a very misleading way. In the statement that there shall not be more than 20 or 25 grains (that is weight) in 100 cubic feet of gas (which is volume), weight is opposed to volume, which deceives the many. Instead of stating sulphur in grains, it should be stated as a per centage, and then you will see that the proportion is so small that it is almost inappreciable.

The weight of 100 cubic feet of ordinary gas at (say) specific gravity ·422 is 22,500 grains, of which the sulphur forms a very small proportion indeed, as the table appended, given by Mr. Livesey, of the South Metropolitan Gas-Works, will show:—

25 grains, being	1-900th	part, or decimally	·0011,	or 11-100ths	per cent.
30	1-750th	"	·0013,	or 13-100ths	"
35	1-643rd	"	·0015,	or 15-100ths	"
40	1-562nd	"	·0018,	or 18-100ths	"

or, if stated by comparative volume (supposing that it is a vapour of bisulphide of carbon, which has not been proved), we have, at 35 grains to the 100 cubic feet, 5 cubic feet in 10,000, or 1-2000th part by volume.

Looking at the above facts, it will at once be apparent how little Alderman Cutbush understands the subject of sulphur compounds, when we find him comparing weight against volume, and calling it a *per centage*, thereby misleading the public. He also refers to a room in his printing establishment, where he says he has from 30 to 40 gas-burners, and that, when alight, the taste, smell, and heat soon become palpable. I have seen the room referred to, and my answer to Mr. Cutbush's statement is, that he alone is responsible for the nuisance caused, through having so many lights, and so large a number of men in so small a room, without proper ventilation.

I have stated, upon a former occasion, publicly "that both gas and men require a given quantity of oxygen from the air to properly support them, and that both give out heat and carbonic acid which vitiates the atmosphere, and, when there is imperfect ventilation, causes the oppressiveness which people so often complain of." But the smell spoken of is chiefly due to the want of fresh air, the absence of which leads to imperfect combustion; the consequence is that the gas is not properly consumed.

I quite agree with Dr. Oliver, that particles of free sulphur in the air might be irritating, but we are dealing with the combustion of coal gas, which only contains about 1-2000th part by volume of bisulphide of carbon, and, if I properly understand the doctor, he infers that this small per centage during combustion is converted into sulphuric acid, which, however, is a disputed point, for Dr. Odling and others adhere to their convictions that the greater part is converted into "sulphurous acid gas," and state positively that it is not injurious to health.

If a little sulphur in gas had been injurious to health, then the most stringent impositions as to its removal would have been justifiable, but upwards of 50 years of gas lighting have failed to establish such a position. Anyhow, as matters stand, we are, even with the assistance of the highest chemical talent, only able to remove part, at a large cost in purification. I have been successful in keeping down sulphur, but the results obtained will no doubt vary with the different samples of coals.

If the consumers are willing to pay an extra price for gas, and the local authorities will guarantee that they will not indict you for any nuisance produced in purification, you might please them by erecting extra purifiers for the purpose, but taking into consideration the important evidence given lately before a parliamentary committee by eminent chemists, I do not think it advisable to do so.

In conclusion, I must observe that it is a remarkable fact that when a corporate body has opposed a gas company in Parliament, and the opposition has terminated in the transfer of the gas undertaking to the corporation, the latter has generally been found as anxious to withdraw from, and get rid of, the stringent clauses relating to extreme purification as they had formerly been to impose them upon the gas company.

However, I will continue to do my utmost to carry out your instructions by keeping the sulphur compounds as low as is practicable by the ordinary system of purification.

(Signed) JOHN WEST, Engineer and Manager.

The CLERK also read the following document prepared by Mr. Adams, in reply to Mr. West's report:—

To the Gas Committee of the Borough of Maidstone.

Mr. Mayor and Gentlemen,—On your reference of Mr. West's report, and in pursuance of your instructions, I beg to offer the following remarks upon the question of sulphur in gas.

To enable you to do justice to all parties concerned, it is necessary I should state the case more fully than I might otherwise feel myself called upon to do.

Crude gas, as it comes from the retort in the process of manufacture, contains a variety of impurities, including sulphur. This sulphur is not an adulteration, but an unavoidable impurity which has to be got rid of as far as possible by a process of purification.

In the early history of gas-making, this purification was accomplished by passing the gas through wet lime, and for 30 years this was the process universally and exclusively adopted till about the year 1856, when hydrated oxide of iron was introduced to replace the wet lime.

Up to this time the sulphur impurity was believed to be entirely due to sulphuretted hydrogen, a most foul and offensive gas. Either of the two agents named is capable of entirely removing sulphuretted hydrogen, but with this great difference—oxide of iron is cheaper, it can be used over and over again, and is less disagreeable to the operatives and those living in the immediate neighbourhood of the gas-works.

In process of time, however, as gas-testing improved, it was found by Dr. Letheby that gas, perfectly purified from sulphuretted hydrogen, contained sulphur in other forms, chiefly as bisulphide of carbon, and it soon came to be known that the new method of purification by oxide of iron has no power to remove this bisulphide of carbon, although the older wet lime method has. This discovery has led to a partial return to the more expensive and less agreeable lime process, and here lies the issue of the sulphur question.

The Maidstone Gas Company still use the oxide of iron, thus securing their customers against sulphuretted hydrogen, but not securing them against the other sulphur impurities.

The contention on the part of the gas company is, that the sulphur due to this imperfect purification is infinitesimal in amount, and in no way injurious to the consumer; and, further, that its removal by the lime process would entail an intolerable nuisance; for which reasons they argue they should be left to supply gas without any restriction whatever on account of sulphur impurities other than sulphuretted hydrogen, even though this sulphur may and does often exceed 40 or more grains per 100 feet.

Precisely this same position was taken by two large gas companies (the Crystal Palace District and The Gaslight and Coke Companies) before a committee of the House of Commons, during the last session of Parliament, in support of their application for Acts to relieve them of the sulphur difficulty.

The results of their applications were that the committee decided against the gas companies in each case.

To pass lightly over the points of contention:—First, as to the *quantity*—great ingenuity has been exercised to throw ridicule upon this question, by bringing into strong contrast the relatively small quantity of sulphur as compared with the greatly larger amounts of other constituents of the gas and atmosphere associated with it in its combustion. To my mind, this is a wrong and altogether misleading way of looking at it. Looked at from an independent point of view, *the absolute* (not the relative) quantity is by no means the insignificant thing some would have us believe. I will show you that it is not so.

The sulphur compounds, as burnt in gas, are practically all converted into sulphuric acid; this, in effect, more than trebles the weight of the sulphur—that is to say, a gas containing 40 grains of sulphur per 100 feet would, in its consumption, give out rather more than 122 grains of sulphuric acid. To apply this to practice, suppose an ordinary dwelling-room, lighted by a three-light gas pendant, with burners consuming 5 feet

per hour, such an arrangement would give out daily an average of 91·5 grains of sulphuric acid, or on a long winter's night, say from 4 till 12, 146·4 grains—that is, more than *one-third of an ounce* of the strongest oil of vitriol. Apply these facts to large establishments, where 20, 30, or even more burners are in operation, to say nothing of cases where gas is used for warming, we must reckon the sulphuric acid product in parts of a pound rather than in parts of an ounce.

Most people will probably be inclined to consider such quantities formidable rather than infinitesimal, and so, no doubt, they would be but for the facts that the acid is largely diluted by the atmosphere and watery vapour, but chiefly that ventilation carries the greater part of the sulphur product harmlessly away. There are many cases, however, where ventilation *is not*, and even some cases where it *cannot*, be effectually carried out.

Still, in spite of all ordinary ventilation, the pernicious action of these sulphurous fumes is evident enough, and there is no doubt they effect material injury to property, and inconvenience to health.

A striking case came to my knowledge a short time ago, which fixes the injury upon the sulphur in the gas in such a way as no argument can escape from.

A clock hung in an office in Maidstone, where gas was burnt during certain fixed hours every day; in course of time this clock became greatly corroded in certain parts of its mechanism, and these parts had deposited upon them crystals of sulphate of copper. Now the clock was so protected that the vapours from the gas could only gain access to its interior by way of the hole used for winding it up. Behind this hole passed certain parts of the mechanism in regular revolution day by day, and careful inspection showed that it was only those parts which had to pass by the hole during the hours the gas was lighted that had been destroyed. This instructive case is illustrative of the damage which is done to property.

The extent of the injury done to health by the sulphur in gas, *per se*, is not so clear, for it must be borne in mind that there are other things associated with it in the burning of gas, greatly exceeding the sulphur in its injurious effects.

These are principally *carbonic acid, heat, and unburnt or partly-burnt gas products.*

Carbonic acid, the chief of these, is quite as injurious and poisonous as, perhaps more so than, sulphurous or sulphuric acid; and the quantity of this carbonic acid, no matter whether the gas is good or bad, is always much the same, and is about a thousand times greater than the sulphurous vapours, even in the worst specimens of coal gas.

Heat also adds greatly to the inconvenience.

These two things, carbonic acid and heat, are inevitable and irremediable; ventilation alone can mitigate the evil. But not so with the

Unburnt, partly-burnt, or over-burnt gas products, corresponding to those very disagreeable emanations which proceed from the smouldering wick of a candle after the flame has been blown out; these contribute not a little to the oppressiveness and otherwise unpleasant effects of badly-regulated gas burning, the remedy for which, however, is entirely in the hands of each individual consumer, whose interest and comfort depend upon using the best forms of burner, avoiding the flaring and roaring caused by imperfect burners, undue pressure, draughts of air, and so on. A little intelligent care in these matters will abundantly repay the trouble, for, besides preventing the noxious fumes now under consideration, the ceilings will not be so liable to get black, the gas will give more light, and the consumer will reduce his gas bills.

This important matter of gas-burners receives far less attention from consumers than it ought, and I have frequently heard the evils arising therefrom set down to the sulphur impurities. I advise every one to have his burners looked to now and then, avoiding the peripatetic dealers.

But, over and above all that has been said, common experience teaches us that sulphurous gas creates an acid and choky sensation, similar to that which one perceives in a London fog, especially where gas-stoves are used, and that this kind of offence is associated with a particularly sickening and oppressive feeling, which neither pure gas nor any other form of illumination brings with it.

It is true that Drs. Odling and Russell have striven to explain away the above facts; but, on the other hand, a number of witnesses have testified in support of them, including some of the most eminent chemists and engineers of the day; to quote one whose authority and competence no doubt will be cordially accepted.

Dr. Letheby, replying to Dr. Odling, spoke as follows:—

And now I am desirous of making a few remarks on the effects of the sulphur in coal gas. Dr. Odling has directed your attention to this matter from a statistical point of view, and has shown you how, by a mathematical process, the amount of sulphur acids in the products of burning gas may be reduced to a vanishing point, and that, therefore, they must be insignificant and wholly harmless; but I will ask you to look at the subject from another point of view, and to examine it by the light of facts as well as of figures. About 15 or 20 years ago, when I began to inquire into this matter, I was struck with the circumstance which is now, as it was then, very remarkable—namely, that wherever gas is burnt continuously, and in large quantity, it causes a rapid destruction of textile fabrics, with a very acid condition of them. This is notably so in our public libraries, and in warehouses and shops. I obtained so many striking proofs of this, especially from the libraries of the Athenæum Club House, the London Institution, the College of Surgeons, and elsewhere, that I made them the subject of a special report to the City authorities in 1854; and here you will see the specimens of covers of books which were furnished to me at that time. If you apply a little piece of the leather to your tongue, you will taste its acidity; and if it be treated by water or spirit of wine, and tested with a solution of baryta, it will be found that the acid is sulphuric acid. These effects were observed many years ago in the library of the Athenæum Club House, and they were growing to be so serious that the managers requested a commission of chemists, including Mr. Faraday, Mr. Brand, Dr. Prout, Mr. Aiken, and others, to inquire into it, and I have before me a copy of their report on the subject. It is to the effect that the mischief is clearly due to the presence of sulphuric acid which had come from the burning gas; and they state that the mischief will continue so long as gas is used in the library without proper ventilation. Mr. Faraday thereupon designed the system of ventilation which is still used in the library. As to the effects of the products of burning gas on shop goods, they are notorious, for such goods are regularly disposed of as damaged or gassy things.

It has been remarked too, that plants are quickly killed by the products of burning gas, for they are peculiarly susceptible of injury from the presence of sulphurous acid in the air. According to Drs. Christison and Turner, as little as one part in 10,000 of air will kill plants in 24 hours.

And you cannot use gas in a conservatory, either for heating or illuminating purposes, unless the products of combustion are entirely removed.

Dr. Christison has written to me very strongly on this subject, and he attributes the absence of flowers and plants from the rooms of Edinburgh to the circumstance that gas is universally used in them. Advancing a step further in my inquiries, I ascertained that the water produced by burning gas, collect it how you will, is always acid, and will rot leather, paper, cotton, and linen. Here are specimens of tissues which have been dipped in the condensed liquid products of gas combustion, and you will observe they are as rotten as tinder. Lastly, I contrived a plan whereby the amount of sulphur in coal gas could be estimated. I had thought that the instrument was sufficiently well known, and the *rationale* of its action thoroughly understood; but the instrument which Dr. Odling has placed upon the table, and has described to you as my ingenious contrivance, is so different in all its essential particulars from my instrument, that I disown it, and call it an ingenious perversion of the apparatus which bears my name. I know from experience that such an instrument will not discover half the amount of sulphur that is really present in coal gas; and I have no doubt that the discrepancies which have lately been referred to by writers on this subject have been occasioned by the use of such an instrument as is now upon the table.

The particulars of my instrument, the measurements of the several parts of it, and the mode of using it, are fully described in Mr. Sugg's book on "Gas Manipulation," and if it be used in a proper manner it will discover all the sulphur of the gas; and thus it will be found that the amount of sulphur may reach from 30 to 40 grains per 100 feet of gas. If the presence of sulphur in such quantity in coal gas was an unavoidable necessity, and could not be reduced by any reasonable process of manufacture or purification, it would be folly to complain of it, other than to show the necessity for good ventilation where gas is burnt; but this is not the case, for there are processes of purification which will easily diminish the amount of sulphur to less than half the usual quantity. Mr. Hawksley, whose presence this evening will, I hope, be useful to us by his giving us the results of his large experience in this matter, has shown that, by copiously washing raw gas with ammoniacal liquor, it is possible to remove a large proportion of the sulphur compounds of gas, without injuring in the slightest degree its illuminating power.

After this treatment, the gas should be deprived of its sulphuretted hydrogen by means of hydrated oxide of iron, and then, while a little ammonia is still remaining in it, it should be further purified by passing it through dry lime, which is the slightly moistened hydrate of lime. In this way the ammoniacal liquor is strengthened to a high degree, it being rarely less than 10 ounces strength, by the absorption of ammonia compounds, and by the removal of sulphur in other forms than that of sulphuretted hydrogen.

The hydrated oxide of iron is also less foul than it usually is, and is capable of revivification without causing annoyance; while the hydrate of lime is actually inoffensive, for it contains nothing but carbonic acid and sulpho-cyanogen with a little sulphide; the carbonic acid being absorbed from the gas, and the sulpho-cyanogen and sulphide produced by the reaction of ammonia on bisulphide of carbon in the presence of caustic lime. Mr. Hawksley will tell you, what I also know from experience, that by these means the amount of sulphur in coal gas is easily and certainly reduced to about 10 or 12 grains per 100 cubic feet of gas. It is easy, as I have said, to meet this question by a numerical argument, and to show by a mathematical process of reasoning that the amount of sulphur in gas may be made to vanish to almost nothing; but I would rather examine the practical or experimental fact, and endeavour to remedy what is, among practical men, an acknowledged evil, by applying those remedies which are clearly within our reach.

This excerp is so full, and so much to the point, that it will only be necessary to say a few words on the questions of *cost* and *risk of nuisance*.

In the examination of the deputy-chairman of the Crystal Palace District Gas Company, before the committee of the House of Commons, I find the following:—

Mr. *Henry P. Stephenson:* I am a member of the Institution of Civil Engineers, and a director of the company since their origin about 23 years ago. I have made a very accurate calculation showing the increased cost arising from the extra use of lime which has been imposed upon us. I have taken 3½ years before the passing of our Act of 1873, and 3½ years since the passing of that Act. The cost before the passing of the Act was 0·318 of a penny, and since 0·875 of a penny. But during 1876 we had still further to increase the quantity of lime, and the cost was 1·166 of a penny. The net result to the consumer, taking into consideration the interest and so on, is a cost of 1d. per 1000 feet, and that would represent about £1500 a year upon the amount sold. During the 3½ years before the passing of the Act we used 807 cubic yards of lime, but during 1876 we used 1576 cubic yards in that one year, which almost amounts to one bushel per ton of coal carbonized. The quantity of gas made does not affect the cost of purification per 1000 feet of gas.

Turning to the last point, we have to meet the statement that the process employed for the removal of sulphur causes a nuisance.

It must be at once admitted that "spent lime" is filthy smelling stuff, and that, for the operatives engaged, purification by lime is an unpleasant process; and further, that, unless great care is taken against an improper exposure of the foul lime, bad stinking odours are liable to be carried beyond the bounds of the works, thereby rendering the gas company liable to an action for a nuisance. I am unable to find any instance where such an action has been sustained, still there is no doubt that lime purification has led, in several instances, to harassing complaints.

This much said, all has been said that can be said in support of the nuisance plea. There is nothing to show that those stinks are injurious even to the workmen, and it is pretty clear they can be kept within the precincts of the works by proper arrangements and precautions. The difficulty varies with the situation of the works; in the Metropolis cramped for space, hemmed in by a densely packed neighbourhood, without river access or other easy outlet for refuse material, the difficulty greatly exceeds that of a country works, with abundant space, fairly open situation, having river frontage. And yet, with all the impediments of inconvenient situations, the metropolitan companies have had the necessity of using the lime process forced upon them by the London Gas Referees—a body of eminent scientific men appointed by the Board of Trade, and selected for their competency and impartiality, who are charged with the duty "to ascertain from time with what degree of purity the company can reasonably be required to make and supply gas continuously without occasioning a nuisance to the neighbourhood in which the works are situated." And they, the companies, as a matter of fact, do use the lime process, and by its use keep down the sulphur to an average of 15·31 grains per 100 cubic feet, without rendering themselves liable to an indictment for nuisance.

To give you another practical illustration of what can be, and is done, and that by a corporation too, after the transfer from a private company, I beg your attention to the evidence of Mr. Matthew Hill Loam, who says:

I have been connected for nearly 26 years with the Nottingham Gaslight and Coke Company. For some time I held the position of resident engineer under Mr. Hawksley, he being engineer-in-chief to the company at that time. The works have now been transferred to the Corporation of Nottingham, and I remain as assistant engineer. The works are very considerable, very large; their area of supply being very nearly 150 square miles. In 1851 the largest daily consumption during the winter was 400,000 cubic feet. Last winter it amounted to 4½ millions. The gas supplied has always been of a very high illuminating power, and of good quality. Since the transfer of the undertaking to the corporation, great care has been taken to maintain that quality and purity. The gas is tested in the usual way; the illuminating power is ascertained by a Bunsen photometer; with the old 15-inch Argand burner we get 17½ candles. We have never adopted the "London" burner yet. During the last six months the average of the sulphur compounds has been 12·65 grains per 100 cubic feet. We purify chiefly with lime, using the oxide of iron in the catch purifier."

Now using lime, and arriving at that amount of purity by it, how do you manage in removing the foul lime from your purifiers? The purifiers are cleaned out as rapidly as possible, and the refuse lime is removed to a place of deposit, and covered over with cold refuse lime—the lime which has already been used and gone cold. The nuisance from the foul lime is really not perceptible, it is not discovered beyond the precincts of the works, or very really so, indeed the Nottingham Works are within the town. The largest of our works are about 2½ miles from the town, and we have another small works about 1½ mile from the town.

Is there a considerable population round your works?—Oh yes; the chief population is within the area of the works.

Can you tell the committee a little how you use this spent lime after it comes out of the purifiers?—The cold lime is simply thrown over the warm lime taken out of the purifiers. That is a simple process, and we have occasionally covered the lime over with tarpauling.

You have not experienced any difficulty?—We have experienced no difficulty whatever. At the Nottingham Works we are really surrounded by the largest population, and we never have had a complaint to my knowledge.

Cross-examination.—We are under no restriction in reference to these compounds. We remove them, from our desire to supply a good article. Our gas is better than that of London, and we charge 3s. and 2s. 10d. per 1000. Before the advance in the price of coal we charged 2s. 8d. I have never smelt the foul lime at 200 or 300 yards from our works. We discharge our purifiers about once a day in winter time.

To summarize my opinion on this matter, I am satisfied the outcry against the sulphur impurities is no sentimental grievance; they cause material damage to property, and offence and discomfort to persons. There is no doubt they can be greatly reduced by a slight additional cost in purification. The risks of nuisance upon the banks of the Medway cannot be greater, but, on the contrary, must be less than in the midst o London at the metropolitan works.

It must however be admitted the purification from sulphur is a refinement in gas-making, but the people of Maidstone have as good a right as the people

of any other place to an especially pure gas, and, to the best of my belief, our gas company are willing and anxious we should; they are served by an energetic enterprising manager, whose pride is in his work, and I shall be much mistaken if Maidstone is allowed to be behind such places as Nottingham, Leeds, Pontefract, Dover, Newcastle, Waterford, Cork, &c.

(Signed) MATTHEW ALGERNON ADAMS, F.R.C.S. Exam., F.C.S.,
County Analyst, &c., Gas Analyst to the Borough of Maidstone.
Ashford Road, Maidstone Aug. 29, 1877.

Dr. OLIVER moved—"That this board, having learnt from the report of the borough analyst that the proportion of sulphur in the Maidstone gas has been for some time past double that contained in the London gas, and being advised that so considerable a portion is injurious to many textile fabrics, as well as the public health, are of opinion that this impurity should be kept within the limit fixed by Act of Parliament for the metropolitan gas companies—viz., 20 grains in every 100 cubic feet."

Mr. WELLS seconded the motion.

Alderman EDMETT said he did not rise to oppose the motion, but there were one or two facts which he wished to state. The board were aware that the sudden rise in the quantity of sulphur, in the gas supplied by the company, to 40 or 50 grains had only occurred during the previous few weeks. The directors were recently congratulating themselves because they had lowered it to about 36 grains, but to their surprise they found at their next trial that it had again increased. They had been endeavouring to find out the cause, and had hoped that they had made the discovery in a leakage of a complicated portion of their machinery, but apparently that was not the cause of the presence of so much sulphur. The directors were just as anxious as the public to remedy this state of things. Referring to the fortnightly report of Mr. Adams he said it was unfair, and showed animus to quote at the end of the report a comparative table of the quality of the gas supplied in London, and he asserted that the illuminating power of the metropolitan gas was not so good as their own, whatever might be said to the contrary.

Alderman ELLIS said it was quite clear that there were certain impurities in their gas, and that, by a certain process, their quantity could be considerably reduced. It was, therefore, the duty of the board to see that the gas supplied to the town was purified as much as possible, but he thought it would be wiser to adjourn the discussion for a fortnight, and in the meantime to supply each member of the board with a printed copy of the two reports.

Alderman WICKHAM thought they ought to forward a copy of Mr. Adams's report to the gas company, and he moved an amendment to that effect.

Mr. PRYER seconded it.

Dr. OLIVER expressed his willingness to withdraw his resolution in favour of one such as that suggested by Alderman Ellis.

Alderman ELLIS then moved a rider to Alderman Wickham's motion, to the effect that the two reports should be printed and supplied to each member of the board, and that the discussion thereon should be adjourned for a month.

Mr. KNIGHT seconded this proposal, and it was carried.

THE LEICESTER GAS COMPANY AND THE CORPORATION.

PROPOSED GAS-WORKS EXTENSIONS.

A Special Meeting of the Leicester Town Council was held on Tuesday, the 11th inst.—the MAYOR (Mr. W. Winterton) in the chair.

The Gas-Works Purchase Committee presented the following report, signed by the mayor, as chairman:—

The committee specially appointed by the council, on the 31st of July last, to confer with the directors of the gas company as to any immediate requisite extension of works, and to make preliminary arrangements for the assignment to the corporation of the company's works and undertakings, have to report that they met and appointed a deputation of three gentlemen to meet a like number of directors, and that a meeting of the representatives of the two bodies took place on the 26th ultimo, when a memorandum or statement of Messrs. Robinson, showing the necessity for immediate extension of producing and storing power, was read, and of which the following is a copy:—

Memoranda, showing the Necessity for taking Immediate Steps to add to the Producing and Storing Power which the Leicester Gas Company now possesses.

"For many years past the consumption of gas has steadily increased, and has done so at a very uniform rate. In the year 1870 the quantity of gas made was 262,723,000 cubic feet, whereas in the year 1876 the quantity made was 455,255,000, showing that the average increase has been at the rate of 9·70 per cent. per annum in the compound ratio, or nearly 10 per cent. The largest winter 24 hours delivery of gas has also increased at nearly the same rate. In the winter of 1869 it amounted to 1,417,000 cubic feet, whereas in last December it reached 2,596,000, showing that the average increase in the largest day's delivery has been at the rate of 9·05 per cent. per annum in the compound ratio. In estimating the future requirements of Leicester, it will be wise to assume that the increase, both in the annual make and in the largest day's consumption of gas, will continue at the rate of at least 10 per cent. per annum. Calculating the increase to be expected in the annual make of gas at the above rate, we then get the following figures:—Actual make of gas, year ending Dec. 31, 1876, 455,255,000; probable, 1877, 500,880,000; 1878, 550,968,000; 1879, 606,064,000; 1880, 666,670,000; 1881, 733,337,000; 1882, 806,670,000; 1883, 887,337,000; so that, by the year 1883, we shall in all probability have nearly doubled the present make.

"In like manner, if we calculate the probable largest day's consumption of gas at the same rate of increase, we find the following results:—Actual largest 24 hours delivery of gas, winter of 1876, 2,596,000; probable, 1877, 2,855,000; 1878, 3,141,000; 1879, 3,455,000; 1880, 3,800,000; 1881, 4,180,000; 1882, 4,598,000; 1883, 5,058,000; again very nearly doubling the largest 24 hours delivery of gas in seven years.

"Of course the capacity of gas-works must be equal to the greatest demand which can be made upon it in one day. The present works can make about 3,500,000 in 24 hours, but there is only gasholder room for 2,000,000.

"In a large manufacturing town like Leicester, the great bulk of the consumption of gas takes place in the afternoon and early evening during the time the factories are at work. This being the case, it is necessary, in order to work safely and economically, to have a large storeage capacity. Here it would be unsafe and extravagant to attempt to supply the town with a storeage power of less than three-fourths of the largest day's consumption. Our present storeage power of two millions of cubic feet is, therefore, equal to a largest day's consumption, amounting to about 2,700,000. There is no reasonable doubt that more than this quantity will be required in the coming winter, and if trade improves, the consumption in 24 hours in the middle of the winter of 1878 will probably be very much in excess of the quantity which our present capacity for storeage is calculated to supply. And it must be borne in mind that it is always necessary at a gas-works to have in hand a power of supply considerably in excess of the probable requirements, for an accident, or two or three consecutive days of foggy weather, may upset all calculations. To sum up the results of what has been stated above, the gasholders now in use will not be of sufficient capacity to supply with safety and economy the probable quantity of gas required in the winter of 1878, and, therefore, immediate steps should be taken to supply the anticipated deficiency by erecting a gasholder on the new site. The producing power of the present works will probably be exhausted by the winter of 1879, and a complete set of new manufacturing apparatus should be ready for work on the new site, at the lateat by the autumn of 1880, or, if possible, in the previous year, so that should the consumption during the winter of 1879 exceed the quantity estimated, the new works may be ready to supplement the old.

(Signed) "G. A. ROBINSON.
"C. S. ROBINSON."

In addition to affording the information contained in the memoranda and other general information, the directors agreed to furnish the representatives of your committee with the evidence proposed to have been given before Parliament, by Mr. Stevenson, C.E., London, and Mr. King, C.E., Liverpool, engineer to the Liverpool United Gaslight Company, and in reply to a question by the deputation, the directors and their managers, Messrs. Robinson, stated that they do not think there is any fear of the electric light interfering in any serious degree with the requirements for coal gas, and assured the members of the committee that this opinion was arrived at on most reliable data. The information afforded and the surrounding circumstances were very fully considered by deputation, and the following report was presented by them to your committee:—

"That, having heard the views of the directors of the gas company, and read and considered Messrs. Robinson's statement as to the necessity for an extension of works and storeage capacity, and also the evidence proposed to have been given before Parliament by Mr. Stevenson, C.E., London, and Mr. King, C.E., Liverpool, the sub-committee do not feel that they would be justified in advising the committee to recommend the council to further oppose the erection of gas-works on the Aylestone Road site, provided that arrangements for the corporation land required can be agreed upon with the Estate Committee in case the assignment of the company's undertaking to the corporation should be carried out."

After a very lengthy deliberation, your committee unanimously adopted the recommendation, and the Estate Committee was directed to be summoned in order that their opinion might be ascertained. This was done, and at a meeting held on Thursday last, after the question had been very full considered, the following resolution was passed.

"That this committee concurs in the determination of the Gas-Works Purchase Committee, and it hereby consents to a recommendation to the council that the company be allowed, subject to arrangement with tenants, to take possession of the land belonging to the corporation, and scheduled in the company's last Act of Parliament, on their undertaking, under the common seal, to pay a price to be afterwards agreed upon, or in default of agreement, to be settled by arbitration, as provided for in the company's Act of Parliament, with interest at 4 per cent. per annum from the taking of possession till the payment of the money."

It will be in the recollection of the council that one of the conditions in the agreement for the corporation was that their opposition to the Bill then being promoted by the company in Parliament should be withdrawn, the clause being in the following words:—

"The company shall proceed to obtain their present Bill, the opposition to which by the corporation shall be withdrawn; but such Bill, and all powers to be thereby obtained, shall be considered as subject to this agreement, and be transferred with the undertaking to the corporation. The company shall not issue any further share capital until the result of the application for the Bill be ascertained. If more money shall be required by the company than their present borrowing powers shall suffice to supply, the company may borrow from their bankers or other persons, on the best marketable terms in lieu of issuing shares, and any such loans shall be taken to by the corporation as part of the obligations of the company."

And it was further provided, that

"Until the actual transfer to, and taking over by, the corporation, the company shall carry on their business and make all payments as fully as hitherto, and make such extensions as may be necessary, and act in the management of their business for the benefit of the undertaking, as if no agreement had been entered into, but they were carrying it on for the benefit of their shareholders."

And the agreement also provides that if the requisite parliamentary power is obtained, the undertaking shall be taken over by the corporation on June 30, 1878. Some amendments were made in the Bill by Lord Redesdale and Mr. Raikes (the Chairman of Committees in the Commons) and it subsequently received the Royal Assent—it providing for the compulsory purchase of the whole of the land originally scheduled, nearly 34 acres, 18¼ acres of which belong to the corporation, and authorizing the raising the capital applied for—namely, £250,000 by shares, and £65,000 by borrowing. Although the opposition of the corporation was withdrawn, and the Bill allowed to pass which authorizes the company to exercise the powers thereby conferred, no specific approval of the proposed new site was intended to be conveyed by the withdrawal of the petition of the corporation, it being obvious that the company would not be likely to proceed with the erection of the works there, without first ascertaining the views of the corporation; besides, as owners of land, there would be opportunities for their delaying progress of the company if found necessary to do so. Your committee have, however, as was confidently anticipated, found the company most anxious to act in harmony with the views of the corporation, and to render them all the information in their power. They further find that there is, beyond all doubt, urgent necessity for immediate steps being taken to add to the producing and storing power which the company now possess, and, having regard to all the circumstances and the information afforded them, they think it desirable that the council should not take the responsibility of offering any further opposition; but should consent to the company taking possession of the 18¼ acres of land on the terms previously stated, and to their forthwith commencing the following works, namely:—Formation of railway siding and retaining-wall; construction of two gasholder-tanks, and one gasholder; the erection of a retort-house and other buildings; and the laying of a main along the Aylestone Road to connect the new works with the present system; the estimated cost of which is about £115,000.

Mr. GRIMSLEY, in moving the adoption of the report, said the committee appointed him, with the mayor and Mr. Holyland, as the deputation to wait upon the directors of the gas company in reference to the required extensions. The facts and the figures which were laid before them at that meeting were of so startling a character as to satisfy them of the absolute necessity of taking immediate steps in the matter, and upon their recommendation the committee unanimously decided to offer no opposition to the directors with reference to their proposed extension. Before they could come to the council, however, it was necessary to have the concurrence of the Estate Committee, and although the members of that committee very properly viewed the question simply in the light as to how far it would affect the value of the estate immediately in that locality, they had, by a very large majority, decided to recommend the same course which the Gas Committee had decided upon. Having, therefore, satisfied both the committees of the wisdom of concurring in the proposal of the directors, it only remained to state to the council and to the public the reasons upon which they based their recommendation for the adoption of the report. In the first place he wished to call the attention of the council to the very rapid growth of this concern. In 1860 the number of meters used in Leicester was 4870; in 1876 that number had risen to 16,494, and he was informed that these numbers pretty fairly represented the number of accounts in Leicester. But when he told them what rapid strides had been made in the quantity of gas that had been produced at the works, he thought they would be still more astonished. In 1860 there were 116,381,000 cubic feet of gas made; in 1870 the quantity had risen to 262,723,000 cubic feet; and in 1876, as the report of Messrs. Robinson showed, it had still further risen to 455,255,000 cubic feet, showing that, in a period of 16 years, the production of gas in Leicester had been increased nearly four times. Messrs. Robinson, basing their calculation as to the future upon the actual experience of the past, said in their report that the probable quantity of gas which would be made in 1883, only seven years hence, would be 887,337,000 cubic feet; and if Messrs. Robinson had gone to the year 1892, which would cover the same period in advance as he had given them in retrospect, the probable quantity of gas which would be required for the people of Leicester only 16 years hence, assuming that the increase in the future was at the same rate as it had been in the past, would be over 2000 million cubic feet. He thought, therefore, that when they came to consider the question of the erection of new works or the reconstruction of old ones, they would be very highly censured if they did not, at all events, look forward to the very short period of 16 years. He would now give them what was the largest day's consumption, because the works, of course, must be of a magnitude to supply a demand which might arise on any given day. He found that the largest day's consumption in 1876 was 2,596,000 cubic feet. Messrs. Robinson said that the probable largest day's consumption in 1883 would be 5,058,000 cubic feet; and if they had gone on to 1892, still the same period in advance, it would probably be about 12 million cubic feet. Now, at the present time there was only gasholder room for 2 million cubic feet, or equal to about three-quarters of the present largest day's consumption. In all well-regulated establishments, managers, as a rule, always insisted upon having storeage room equal to three-fourths of the largest day's consumption; and in many cases, he was informed, they had storeage room sufficient for a full day's consumption. If, therefore, an accident were to occur, or foggy weather were to intervene, the managers of these works would actually be unable, at the present time, to supply Leicester with enough gas, consequently the only means whereby that difficulty could be obviated would be by keeping the retorts charged during the whole of the day. This was a costly mode of procedure, as there was a waste of labour and a waste of material, and Messrs. Robinson, as economical managers, could not possibly give their sanction to such an

expensive mode of conducting the business. The present works were capable of producing, if taxed to their utmost, about 3,500,000 cubic feet, and the capacity of the works would be tested, it was anticipated, to the very utmost, during the next, or the following year. There was an absolute necessity, therefore, for taking immediate steps for the extension of the works, because they could not be enlarged in a day. Probably two years would elapse before they were able to get them into operation. The question of the extension, then, being settled, the next question was as to where it should be made. Before discussing that point, he wished to call attention to another important element which was always taken into consideration before new works were laid out. Gas engineers of the highest eminence said that in order to conduct the business profitably and comfortably, there ought to be at least four acres of land for every million cubic feet made per day. He believed that some engineers went so far as to say that there ought to be five acres. If they calculated upon the four acres, they would find that in 1883 no less than 20 acres of land would be required for both sets of works; and if they went on to the year 1892, they would require no less than 48 acres for both sets of works. With these figures before them, he asked whether it was worth while to attempt to argue the question as to whether there could be any extension at the present works adequate to the future requirements of Leicester. He was sure that their own common sense would tell them that it was utterly impossible to do it. The question then arose as to where this extension should be made. It had been suggested by some that they should utilize the Abbey Meadow. They were probably aware that one of the clauses of the agreement made between the Corporation and the Earl of Dysart, stipulated that the land lying west of the bridle-road from Sidney Street to the Abbey should be devoted to the purposes of a public park, therefore they could not put the gas-works there. The only land available in the meadow was that on the eastern side of the bridle-road, and if they were to be established there they would only have the advantage of the canal. They could not have the advantages of the turnpike-road, and the still greater advantages of the railway. He asked whether they thought it would be wise, seeing that they were about to spend a large sum in converting the Abbey Meadow into a public park, to take an additional nuisance immediately close by. Then he came to the land which had been suggested by the company, and which they had the power to acquire. If the works were to be erected on the western side of the town, it would save the necessity, he had been informed by Messrs. Robinson, of putting down new mains in the streets, inasmuch as the gas coming into the present mains from two points would exercise a pressure about equal to doubling the capacity of the mains. When he told them that there were at the present time over 100 miles of mains in Leicester, they could form some idea of the difficulty which would necessarily arise if those mains had to be substituted by larger ones. Another important item was that instead of carting all their coals from the railway-station, as at present, and then having to go through a large amount of stacking, which was a very expensive process, they would be able at the new works, in consequence of the high level of the line, to tip up the trucks and drop the coals on the spot where they were required. The company were at the present time carting something like 5000 tons of coal a year, and the actual saving would thus be something like 1s. 6d. per ton at present, and their saving in the future would be enormously increased. Wherever the works went it was of the utmost importance that they should have a site which combined all the advantages of road, rail, and river. Then, again, there were the coke and other residual products which had to be disposed of. The advantage of that site would increase the profits of the undertaking, in consequence of the facilities which the company or corporation would have by way of carriage. These were points which had recently been laid with great stress before the deputation and the Gas Committee, and they were, in their opinion, of sufficient gravity to lead them to ask the corporation not to offer any opposition to the site which the directors had selected. The site had been approved by eminent engineers, who considered it a most suitable one. He would now endeavour to explain any apparent inconsistency between their proposal that morning and the course they felt it their duty to take in the earlier part of the year, when the company were before Parliament applying for powers to acquire this site. Those who had had any experience in parliamentary campaigns knew perfectly well that in framing a petition against a Bill everything was urged which was at all likely to have weight in upsetting that Bill before the committee of the House of Commons; and, although they made a point, among many others, that the establishment of gas-works in that locality would depreciate to some extent the value of the estate, he never felt that that was the strongest point in their case. When he found that the company were applying to Parliament for powers to more than double their capital, and to acquire a large tract of land whereon the whole of that capital could be expended within five or six years, and that the certain result of such a course of action on the part of the directors would be to maintain the price of gas in Leicester, he thought he was justified in saying that the establishing of works on the western side of the town would be most disastrous to the ratepayers. If the company had succeeded in obtaining that quarter of a million of new capital on their own account, without any restriction—for Mr. Raikes's Order was not then before the House, nor had it been intimated that such a motion would be made—he ventured to say that the premiums upon that new capital would have been worth to the shareholders £15,000 within seven years, and knowing as he did that there was a strong desire on the part of the council and the public to acquire these works, he thought they would see that they were justified in using the arguments they did, inasmuch as by doing so they had in some way contributed to bring about the purchase, and thereby saved the town the payment of so large a sum for additional premiums. The circumstances of the case, however, were entirely altered that day. They were the fortunate purchasers of these works, and the question they had to consider was what was to be done under the altered circumstances. Admitting, for the sake of argument, that some damage would be done to the estate which immediately adjoined the proposed works, the question they had to determine was whether that damage would be greater than the benefits which would unquestionably be derived by placing them there. After the flood of light which had recently been thrown upon this question, he had no hesitation in saying that the balance of advantage was decidedly in their favour. Therefore, as they were promoting the interests of the town in using the arguments of the site as against the company, so were they now equally promoting the interests of the town in recommending the adoption of the site. They must be aware that the company had the power to take this land without having their concurrence: but, as they were most anxious to meet the wishes of the corporation in the matter, they would much rather that the plans, which they were about to carry out, should have their approval. A very great responsibility rested upon the directors in supplying the town with gas; and, in face of the report which Messrs. Robinson had presented, he asked the council whether they were prepared to disagree with the recommendations which the committee now made, and thereby prevent the completion of the new works until the year 1881. If the directors waived their right to proceed on this land, the corporation would have to apply to Parliament again for a new Bill for a fresh site, and before that could become law, the year 1879 would have dawned, and two years more would elapse before the works could be completed. In the meantime the town might be placed in darkness, and the responsibility for that act would be taken off the shoulders of the directors, and placed upon the corporation. Independently of the urgency of the question, the present time was most appropriate for the erection of the works. They all knew that the iron trade had been for two or three years in a very depressed state, and at the present time it was frightfully so. Where they had works which required a large amount of iron, and also a large quantity of bricks, which he believed were several shillings per thousand lower than they were some time ago, it was of great importance that they or the company should be able to avail themselves of the present low prices for material. He believed the difference in the cost between the erection of the works now and what it would have been three or four years ago would be many thousands of pounds. With regard to the question of the electric light, some people's minds had been very much scared by the introduction of this new experiment—or rather, an old one in a new form; consequently, a second deputation waited upon the directors to ascertain their view with respect to this question, because it might have had considerable influence upon the extensions required. They stated frankly and fully that there was no need to apprehend that the electric light would ever take the place of common coal gas as a general means of lighting, and he had read articles in newspapers to the same effect. In this electric light there was no residual product, whereas in the manufacture of coal gas there was something like 25 per cent. of such product. What with the cost of diffusing this electric light, and the fact that there was no residual product, it was never likely seriously to interfere with the calculations which Messrs. Robinson had made. It might be thought that the electric light could be applied to the public lamps; but if that could be done, and the corporation were the proprietors of the gas, they would also be the custodians of the public purse, and therefore, if they saved anything by the application of the electric light for the public lamps, the ratepayers of Leicester would not be placed in any worse position than now. With respect to the question of the profits of the company, the council would remember that when he introduced the question of the purchase, he told them that he believed they would have £9000 a year left after the payment of the debentures; but he wanted them to look ahead and see what the probable profits of the company would be in the event of the concern increasing in the same ratio as it was predicted. The present capital of the company of £220,000 earned a clear profit of over £25,000 a year; and Messrs. Robinson said that on this new site, by the outlay of £150,000, which the corporation could raise at 4 per cent., and which would, therefore, only involve an annual charge of £6000 a year, they would be able to double the production, and presumably double the profits. His apology for having entered into this question at length was because he felt that, next in importance to the purchase of the concern was the consideration of its extension upon a scale which should be commensurate with the wants of Leicester for many years to come; and if he had endeavoured to put this matter before them clearly, and he hoped convincingly, it was because he had received, in addition to the evidence and information which the directors were kind enough to furnish them with, material assistance from the courteous secretary, Mr. Billson, and the very able managers, Messrs. Robinson.

Mr. HAMES seconded the motion for the adoption of the report.

Alderman BARFOOT moved, as an amendment, that the question be deferred for at least three months. He said he had listened very attentively to the arguments used by the supporters of the resolution, but he failed to see any immediate reason why they should adopt it that morning. They had had put before them a mass of figures, which many of them knew was often done for the purpose of misleading people; and he was afraid that these figures had made too great an impression on the minds of some amongst them. He opposed the erection of the gas-works upon the proposed site mainly on sanitary grounds; and when they considered that for nine months of the year, and often more, the winds blew from the western quarter, and spread themselves over the whole town, he thought it would be seen that the proposed site was a bad place on which to erect gas-works. Another reason why they should oppose the placing of the works on this site was that they had some of the fairest portions of the town estate, which would do for villa residences, immediately adjacent, and the emanations from the gas-works would spread over this land, and would be detrimental to the interests of those who had purchased land from the corporation as sites for such residences. The fumes would also spread over the Freemen's lands, and it would be in their recollection that at a former meeting they would not consent to the Freemen being heard there, on the ground that the corporation intended to oppose the placing of the gas-works on that site. If they changed front in this manner, were they keeping faith with those people in the promise they had made? It was a painful thing for him to have to bring forward, but he could not help referring to the former discussion on the 20th of March last. The proposer of the resolution that they should oppose the gas company placing the works on this site, stated that "He believed it was admitted on all hands that the establishment of gas-works in any district was a great nuisance. They knew that the existence of the present works was such, because they had repeatedly to complain to the company on that head; and, knowing that, he asked whether it would be a wise thing to allow the company to establish a separate and distinct concern in a part of the town which, although not now thickly populated, would in a few years become so, and where the noxious vapours being continually emitted from works of that description would be constantly wafted over the best part of their estate during nine months of the year. Their first objection was on sanitary grounds, but they had another and equally strong objection as the custodians of an estate, the value of which must be reckoned at hundreds of thousands of pounds." That was the opinion of the seconder of the then resolution, and they had heard what his opinion was that morning. It was well known that there were emanations from these works of a deleterious character, and the mayor had told them that it was only because of their inability to get the required certificates that the manufacture of the chemicals had not been stopped. Having had something to do with the formation of a committee to consider this question some years ago, he had the opinion of a chemical authority, who assured him that the gases emitted from gas-works, in the manufacture of sulphate of ammonia, were detrimental to health. He thought the directors of the gas company were exceedingly wise in their selection in placing the gas-works in the north-eastern part of the town, and he hoped the council would emulate their wisdom. Much had been said about the economy of this site, but that remained to be seen. It had not been shown that the works would not damage the town estate, while he held that such would be the case. It had been said that the estate was only partly occupied; but it was well known that the growing town of Aylestone was rapidly approaching Leicester, and the ground there would very soon be covered with houses. They would have to make streets and sewers there, at an increased cost to the borough rate, and he had the authority of Mr. Grimsley himself for stating that it would be a bad sanitary arrangement to place the gas-works there. They ought to try, by every means, to make the town in a better state than it now was. The expense they had incurred in doing so had already been great, but now it was proposed

to place gas-works, which were admitted on all hands to be detrimental to health, in a part of the town where the fumes would spread more than ever over the borough. The main reason why they should do this appeared to be the advantages which would be derived from the works being close to the Midland Railway and the canal, which would afford facilities for the carriage of coal. This reason appeared to be all very well, but would it bear looking at through the light of experience? Last year the Midland Railway Company proposed to put before Parliament a Bill for a line which started from this side of Thurmaston, and which went across the Abbey Meadow to join the line at Freake's Ground. Would it not, therefore, be better to wait for a short time in order to see whether there was to be a further railway development in that quarter? He held that economical considerations were not the only reasons which should weigh with them in a proposal of this kind, but argued that in legislating for the town they should take into consideration its well-being in a sanitary point of view. He called attention to the inconsistent position, nearly the whole of the members of the council who voted, mainly on sanitary grounds, in favour of opposing the company's Bill, would hold if they voted in favour of the present resolution; and in regard to the economical part of the question read another quotation from the speech of Mr. Grimsley, made on the 20th of March, in which he said, "There was another reason why the company were anxious to pass this Bill. They (the company) were making so much profit that the directors were at their wit's end to know what to do with their money? If the company were making so much money, why should the corporation endeavour to deprive them of it if, by doing so, they would damage the health of the town?" On the 20th of March (Alderman Barfoot continued) they passed a resolution pledging the council to oppose the company's Bill, and, on the 11th of September, they were asked to reverse all they had done five months ago, for the simple reason that a conference had been held with the gas-works directors. Was it not a pitiable sight for them to present to the town? How could they tell the inhabitants of the town that they were the leaders of public opinion if on the 20th of March they said it was a right and proper thing to oppose the gas company putting their new works on this site, and then on the 11th of September they came and said, "Gentlemen, we have made a mistake. We have misled public opinion on this matter, and now we ask you to go the whole hog and do what the gas company asked you to do?" It was well known that there was a quantity of land near to the present gas-works, which could be bought at a moderate cost, and if it were important that this matter should be pressed, because in 1879 the town was likely to be in darkness, he considered that the emergency would be better and more economically met by increasing the works on the land adjacent to the present works than on the proposed site. In this way the temporary extension could be made, and in future generations provision might be made across the Abbey Meadow. Lying far away from the town, there was a great deal of land suitable for this purpose. The excavations which would have to be made might be used in raising up the land on the meadow, and this would cost very little, and the land in the locality could then be built upon. He hoped the council would carefully consider this matter, and not hastily adopt the recommendation of the committee, which would involve a large expenditure of money and be disastrous to the health of the town.

Mr. COLTON said he had opposed the gas-works purchase, because he objected to the extension of the works on the western side of the town. He felt that the blind had led the blind, and if this resolution were carried that morning they would all fall into the ditch. The corporation and the company had had hold of hands over a breach, and the company being the stronger of the two had pulled them in. It was not too late to retrace their steps, but if they carried the resolution they would incur an irretrievable loss.

Mr. CHAMBERS supported the motion, having been one of the small minority who voted against the resolution to oppose the company. Mr. Grimsley, who proposed that motion, was not at the time in full possession of the facts, but, under the altered cicumstances, he seemed to have come to a different conclusion, and had with manliness avowed that such had been the case. One of the most satisfactory features in connexion with the gas-works was the steady progress, and therefore the corporation would be warranted in anticipating that that progress would continue. He argued that it had not been proved that gas-works were detrimental to the health of the inhabitants. He had lived in a part of the town where there had been gas-works for 30 years, and the health of the inhabitants around, in times of epidemics, was better than in other parts of the town.

Mr. BERRY thought that the corporation ought to have allowed the gas company to have carried on the works themselves, because the corporation had already business enough on their hands. He held that those who had conceived such a grand scheme as this were the best able to carry it out.

Mr. STAFFORD admitted that at the meeting held to oppose the gas company some things were said, which it would have been better perhaps, to have let alone; but the result of the opposition had led to the purchase of the works, which would be for the benefit of the town.

Mr. RICHARDSON considered that if the council adopted the motion now before them, they would make a great mistake in a sanitary point of view. It was well known that vegetation would not exist in the neighbourhood of gas-works, and what was destructive to vegetable life was also destructive to human life. They were about to establish the proposed works in the best part of the borough estate, the value of which would be greatly reduced thereby. In reference to the electric light, he felt convinced that it would be in future brought into greater use both by railway companies and for civil and military and naval purposes, though he did not think it would ever affect the use of gas for social or domestic purposes.

After some further discussion, both the motion and the amendment were withdrawn, and it was resolved that the further consideration of the report should be adjourned for three weeks.

HULL GAS SUPPLY.—Mr. James Baynes reports that the gas sent into the district of Sculcoates and Myton, during August, by the British Gas Company gave the following results, sulphuretted hydrogen and free ammonia being at no time present to the ordinary tests:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·09	14·90	15·60
Grains of sulphur per 100 cubic feet	30·50	21·90	27·80

Mean barometer, 29·98; temperature, 63°. Mr. J. Baynes, jun., also reports that, during the month of August, the results of the analyses of the gas sent to the district by the Sutton, Southcoates, and Drypool Gas Company were as under:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·01	15·62	15·76
Grains of sulphur per 100 cubic feet	—	—	7·74
Grains of ammonia per 100 cubic feet	—	—	19·01

Mean barometer, 29·87; temperature, 66°.

BOLTON CORPORATION GAS DEPARTMENT.

BALANCE-SHEET, FOR THE YEAR ENDING JUNE 30, 1877.

Dr. — *Capital Account.* — *Cr.*

Amount expended to June 30, 1876	£264,633	15	5	Balance carried down	£454,970	9 9
Increase due to capitalization of annuities, Dec. 31, 1876	155,538	12	10			
Amount expended this year, viz.—						
Mains	9,543	6	6			
New retort-bed	2,323	5	1			
Apparatus	7,371	1	11			
Buildings	13,770	9	11			
Hired meters	1,905	4	1			
Sidings	7	7	2			
	£455,113	2	11			
Cr.—Old metal sold	142	13	2			
	£454,970	9	9		£454,970	9 9
Balance brought down	£454,970	9	9			

Dr.—Revenue Account.

	Year ending June 30, 1877.	Year ending June 30, 1876.
To Cannel and coal consumed	£28,680 18 9	£35,071 10 9
Wages for gas manufacture	5,333 11 2	5,279 12 1
Lime and purifying	1,645 8 2	1,576 18 4
Retorts, materials, and labour	1,417 18 1	1,694 13 8
Repairs of iron and brickwork	3,283 17 9	3,574 8 4
Water	185 5 3	155 1 2
General expenses	290 16 4	140 0 4
Salaries	2,734 2 2	2,667 4 11
Rates and taxes	1,251 17 5	1,205 10 9
Chief rent	143 12 3	152 2 5
Office expenses, stationery, and printing	449 2 4	504 8 5
Law charges	65 2 10	360 16 11
Bad debts	117 7 1	288 7 5
Meters and fittings	6,086 1 9	5,665 18 5
	£51,685 1 4	£58,336 13 11
Balance carried to revenue suspense account	36,699 19 3	28,360 14 3
	£88,385 0 7	£86,697 8 2

Cr.—Revenue Account.

	Year ending June 30, 1877.	Year ending June 30, 1876.
By Gas-rental	£69,277 4 4	£67,944 9 0
Meter-rents	919 11 9	761 0 11
Meters and fittings	7,329 7 4	7,201 3 6
Coke	3,679 19 11	4,060 0 4
Tar	3,392 6 11	3,528 18 0
Spent lime	150 1 6	127 15 2
Ammoniacal salts and liquor	3,368 15 5	2,793 10 1
Rents	112 1[illegible] 11	195 13 0
Sundries	36 11 3	30 15 6
Bank interest and commission	114 1 9	47 0 2
Transfer fees	4 2 6	7 2 6
	£88,385 0 7	£86,697 8 2

Dr. — *Renewal-Fund Account.* — *Cr.*

Expenditure for the year	£4,446	16	10	Balance at June 30, 1876	£5,068	2 4
Balance carried down	7,351	13	5	Revenue suspense account, June 30, 1877	6,730	7 11
	£11,798	10	3		£11,798	10 3
				Balance brought down	£7,351	13 5

Sinking-Fund Account.

Loans repaid during the year	£2,512	0	0	Balance at June 30, 1876	£6,199	17 6
Balance carried down	9,664	5	0	Revenue suspense account, June 30, 1877	5,976	7 6
	£12,176	5	0		£12,176	5 0
				Balance brought down	£9,664	5 0

Revenue Suspense Account.

Annuities account	£14,460	4	10	Balance from revenue account	£36,699	19 3
Interest on loans account	3,532	19	0			
Sinking-fund account	5,976	7	6			
Renewal-fund account	6,730	7	11			
District-rate account	6,000	0	0			
	£36,699	19	3		£36,699	19 3

Proof Balances.

ASSETS.				LIABILITIES.			
Capital account	£454,970	9	9	Stock account	£361,506	2	11
Amount owing to Gas Committee	16,237	2	9	Loans account	96,742	0	0
Stock of cannel and coal	1,730	0	0	Renewal-fund account	7,351	13	5
Do. chemicals	54	0	0	Sinking-fund account	9,664	5	0
Do. meters	366	0	4	Extinction of mortgage debt account	2,512	0	0
Do. fittings	4,651	0	1	Deposit account	5,362	9	0
Bank balance	12,451	10	3	Amount owing by Gas Committee	1,321	12	10
				District-rate account	6,000	0	0
	£490,460	3	2		£490,460	3	2

Gas made in the above year	420,836,000 cubic feet.	
Gas sold and used in the works	380,637,000 ,,	
Loss	40,199,000 ,,	or 9·55 per cent.
Cannel and coal carbonized	38,929 tons.	
Make of gas per ton	10,810 cubic feet.	
Year ending June 30, 1876—		
Gas made	404,422,000 cubic feet.	
Gas sold and used in the works	360,447,000 ,,	
Loss	43,975,000 ,,	or 10·87 per cent.
Cannel and coal carbonized	38,621 tons.	
Make of gas per ton	10,471 cubic feet.	

REDUCTIONS IN THE PRICE OF GAS.—The Ipswich Gas Company have given notice that, from and after the taking of the meters for the December account, the price of gas will be reduced from 3s. 9d. to 3s. 6d. per 1000 cubic feet. Circulars have been issued of the Epping Gas Company intimating a reduction from 6s. 8d. to 5s. 10d. It was announced at the meeting of the Bristol Gas Company, on Friday last, that the directors had made a reduction of 3d. per 1000 feet.

AUCKLAND (NEW ZEALAND) GAS COMPANY, LIMITED.

The Annual Meeting of Shareholders was held on Monday, July 30—Mr. T. MACFARLANE in the chair.

The SECRETARY (Mr. E. B. Parsons) read the report and balance-sheet, as follows:—

The directors have much pleasure in submitting another annual report, and stating that during the past year the business of the company has been carried on in a satisfactory manner.

The recent reduction in the price of gas has led to increased consumption. The balance-sheet shows that the usual rate of dividend for the past six months will be payable to shareholders.

From the greatly increased consumption of gas it will now be necessary to add largely to the working plant of the company, and to raise funds for this purpose the directors propose to issue 500 new shares at current rates. They prefer this course to borrowing capital for the purpose, and they believe that the increased consumption of gas in the city and suburbs will enable the usual dividend to be paid.

Mr. J. L. Wilson and Mr. J. Newman are the directors who retire by rotation, but are eligible for re-election. Two auditors for the current year also require to be elected.

Dr. *General Balance-Sheet for the Year ended June 30, 1877.* *Cr.*

3800 original shares of £5, all paid up	£19,000	0	0	Expenditure—			
200 original shares sold at a premium	1,976	5	0	Freehold and leasehold land, buildings, manufacturing and distributing plant, and meters	£39,127	10	10
1900 second issue £5 shares, sold at a discount	4,977	5	8	Stock of mains, service-pipes, meters, and material, in store and afloat	3,671	5	2
100 second issue £5 shares, sold at a premium	1,000	0	0	Stock of coal	327	14	0
771 third issue £5 shares, sold at a premium	7,647	0	0	Stock of residual products	731	14	0
Total issued, 6771 shares.				Accounts due to the company	372	18	4
Total amount received from shareholders	34,600	10	8	Debentures, reserve-fund investment	3,000	0	0
Additional sum taken from income, and expended in completing works	3,256	5	1				
Amount owing by the company	58	2	10				
Dividend unclaimed	7	10	0				
Bank of New Zealand	1,099	17	4				
Reserve-fund, balance at credit thereof	3,710	0	0				
Profit and loss, balance at credit thereof	4,498	16	5				
	£47,231	2	4		£47,231	2	4

Profit and Loss Account.

Coals carbonized	£4,702	14	3	Gas	£12,413	17	0
Stokers wages	816	9	0	Residual products	1,526	9	2
Distribution of gas, meter inspection, &c.	111	14	9	Transfer fees	4	2	6
General expenses—							
Directors and auditors fees	250	0	0				
Insurance	8	5	0				
Salaries	1,000	0	0				
Stationery, printing, advertising, and stamps	91	8	8				
Petty cash	19	17	0				
Legal expenses	6	2	2				
Rent	164	0	0				
Rates and taxes	375	12	11				
Wear and tear	813	8	5				
Bad debts	38	1	9				
Interest	22	11	10				
Balance carried down	5,524	2	11				
	£13,944	8	8		£13,944	8	8
				Balance at credit, June 30, 1876	£3,915	13	6
				Balance brought down	5,524	2	11
					£9,439	16	5
				Less dividend declared July 31, 1876, and interim dividend Jan. 31, 1877	4,941	0	0
					£4,498	16	5

The CHAIRMAN: It is now my duty to move the adoption of the report and balance-sheet. This, however, is one of those common-place things that require nothing to be said about them to be understood. The report and balance-sheet explain themselves. As a director I have not to say anything, except that the business during the past year involved during its progress a good deal of consideration, and, perhaps, a little anxiety. But when the annual meeting comes round everything appears plain. The most pleasant part of my duty is to announce to the shareholders that their dividends will be payable to-morrow.

Mr. J. L. WILSON seconded the motion for the adoption of the report and balance-sheet, which was carried unanimously.

Mr. J. L. Wilson and Mr. Joseph Newman, the retiring directors, and Messrs. A. Boardman and A. P. Pierce were re-elected auditors.

A vote of thanks was passed to the chairman, and the business terminated.

ON THE DETERMINATION OF THE ORGANIC MATTER IN POTABLE WATERS.

By Professor W. DITTMAR and Mr. H. ROBINSON.

[A paper read before the Chemical Section of the Glasgow Philosophical Society, on April 30, 1877.]

In the analysis of a potable water, the most important element to be determined is the quality and quantity of the organic matter, but unfortunately the direct solution of this problem is, and probably for a long time will remain, beyond the range of the resources of chemical science. All that we possess at present are those two indirect methods proposed about the same time ten years ago; the one by Messrs. Wanklyn and Chapman, the other by Drs. Frankland and Armstrong, and which generally go by the names of "Frankland's process" and "Wanklyn's process" respectively. Both these methods are universally known in all their details; but, that being so, it is surprising to see, and utterly inexplicable on scientific grounds, that so many chemists—especially Mr. Wanklyn and Dr. Frankland themselves—look upon the two methods as quite directly competing with each other; so that, assuming one of them to be proved the better, the other has no *raison d'être*. It is true, if organic matter to be determined could be approached only by proximate analysis on the one hand or ultimate analysis on the other, and if Mr. Wanklyn gave out his albuminoid ammonia process as a means for determining the total organic nitrogen, Dr. Frankland would clearly be in the right and Mr. Wanklyn in the wrong. But nobody would suspect Mr. Wanklyn of looking upon his permanganate process as being anything more or less than a particular form of his method of "limited oxidation"—one of the many ways, in fact, in which organic matter may be questioned by the quantitative application of generic disintegrators. Now, after the many critical experiments made by Messrs. Wanklyn and Chapman, nobody can reasonably deny that Wanklyn's "albuminoid ammonia," although in general rather a complex quantity, bears a definite relation to that part of the nitrogen of a water which exists in certain states of combination, and consequently is a result worth booking, in addition to the total organic nitrogen; while Mr. Wanklyn himself, on the other hand, would surely be the last to deny that his method, in its present form, is far from being so absolutely constant in its results as not to be all the better for being supplemented by a determination of the organic carbon and total organic nitrogen. Clearly the two methods, far from being antagonistic, are destined to supplement each other. No doubt all analysts would soon come to take this view of the matter, and act upon it, if it were not for the fact that Frankland's method, although certainly not difficult, is very slow of execution, and involves the use of cumbrous, costly, and easily-deranged apparatus. What is wanted is so to modify Frankland's process as to considerably shorten it and bring it within the range of ordinary laboratory appliances. This problem seemed to us worth working at, and we accordingly devoted to it part of last summer's holidays; but through various circumstances we were compelled to shelve the subject for some considerable time, and it was only lately that we got the experiments completed.

Determination of the Organic Carbon.

The idea which guided us in the experiments to be recorded under this head was that Frankland's process might be considerably shortened, without any loss of precision, by devoting to this determination a separate quantity (say about a litre) of the water, and—

1. Doing the greater part of the concentration by boiling down with sulphurous acid in a slanting flask; and—

2. Determining by combustion, the carbon in the residue by a proper modification of the ordinary gravimetric, instead of Frankland's troublesome gas-volumetric, process.

About the first point we had at first some serious misgivings, which, however, we are now able to say, after considerable experience, proved unfounded. The practicality of the second point, on the other hand, seemed to us almost self-evident, but it was precisely the one which gave us the greatest amount of trouble to settle.

The *modus operandi* we adopted for the combustion differed in very little from the customary one:—The residue—obtained by boiling down, in a slanting glass flask, a mixture of the water and sulphurous acid, and evaporating to dryness in a glass vessel on a water-bath—was mixed with a convenient quantity of chromate of lead, the mixture introduced into a combustion-tube about 8 to 9 millimètres wide inside and 30 centimètres long,—previously drawn out at one end into a bayonet-shape—a reduced copper-gauze spiral placed in front of the mixture, and the combustion conducted in a current of air supplied by a glass gasholder charged with dilute caustic soda. For the absorption of the water we used a little V-shaped tube containing 60 per cent. sulphuric acid, with which was united permanently a short tube filled with granulated chloride of calcium. From this apparatus the product passed through a small, and, consequently, light, soda-lime tube (having, of course, a layer of chloride of calcium at its exit end), for the absorption of the carbonic acid. The balance we used was a fine Oertling, which, when moderately charged, was constant in its indications to within less than 1-10th of a milligramme. The tare of the tube proved perfectly constant; hence the CO_2 weights observed could be assumed to be correct to within 1-10th, or at most 1-5th of a milligramme—equal respectively to 1-40th of 1-20th of a milligramme of carbon. And this degree of precision is quite sufficient, so that it is needless to inquire whether Frankland's volumetric *modus* would go further, which we beg leave to question.

When we came to test this method by rehearsals with small known weights of pure substances, we were surprised to find that our results were all too high. Thus, for instance—

7·69 milligrammes sulphate of quinine* gave 18·4 milligrammes CO_2, instead of 15·5.

10·64 milligrammes hippuric acid gave 24·56 milligrammes CO_2, instead of 23·54.

8·37 milligrammes hippuric acid gave 21·35 milligrammes CO_2, instead of 18·51.

Where did this excess of carbonic acid come from? The chromate of lead which had been used seemed safe and sound. We had not prepared it ourselves, but its appearance showed it had gone through a thorough process of fusion; besides, before being considered fit for use, it had been powdered, kept at a dull red heat in platinum for a considerable time, and then preserved in a glass-stoppered bottle covered with a glass shade to keep off dust. To get at the source of the error we carried out a systematic series of blank experiments, which soon brought the result that the piece of india-rubber tubing which had been used to join the gasholder to the combustion-tube gave up enough of carburetted hydrogen vapour to the air to furnish, when burned and sent through baryta water, an appreciable precipitate. So, thereafter, we made it a strict rule never to use more india-rubber for any joint than was absolutely necessary for producing a sufficient degree of flexibility. When the air was now passed through the empty tube at a red heat, the baryta remained clear; but when the experiment was repeated with chromate of lead in the tube, there was a dense precipitate of carbonate formed. We accordingly re-fused our chromate in a platinum crucible, and kept it at a bright red heat until part of the oxygen had boiled off, poured the liquid mass into a platinum dish, pounded it in a porcelain mortar, and immediately bottled it up. But even with such chromate the baryta water became as muddy as ever. We then prepared chromate of lead ourselves by decomposing bichromate of potash with nitrate of lead, washing the precipitate by decantation only, drying it in a porcelain basin, and heating it in a small porcelain dish within a Griffin's muffle to the highest temperature which could be used without fusing it. But this preparation also, when heated in air, gave off large quantities of carbonic acid. We next fused this chromate, but it did no good. We were thus forced to the conclusion that chromate of lead, even when free from excess of oxide (PbO), eagerly absorbs carbonic acid from the air or the flame-gases, which cannot be expelled by mere heating in a crucible. There is, however, a way of getting a safe chromate; it consists in taking the ordinary preparation, and heating it in a combustion tube to redness in a current of pure air until it ceases to give off anything that renders baryta water turbid, and to use the product immediately for the combustion to be made. In this manner the following analyses were made:—

	Substance.		CO_2 found.	CO_2 calculated.
1.*	5·700 milligrammes	mannite	8·26	8·26
2.	6·200 „	„	9·10	8·94
3.	3·316 „	urea	2·43	2·43
4.	3·316 „	„	2·80	2·43
5.	3·316 „	„	2·20	2·43

The urea in experiments 3, 4, and 5, was weighed indirectly by measuring off the proper volume of a standard solution. In No. 3 the solution was evaporated to dryness, with addition of a pinch of sulphate of potash, in order to obtain a sufficient body of residue; in the case of Nos. 4 and 5 the urea was dissolved in 500 cubic centimètres of pure water, the solution mixed with 75 milligrammes of common salt, 16 milligrammes of anhydrous carbonate of soda, 5 milligrammes of acid sulphite of soda, and 30 cubic centimètres of a strong aqueous solution of sulphurous acid; the whole

* 0·5 gramme of which gave 0·1349 of sulphate of baryta = 9·26 per cent. of SO_3 instead of 9·19.

boiled down to a small bulk in a slanting flask, and the residue evaporated to dryness in a basin covered with a screen of filter-paper on a water-bath.

The results, although not quite so exact as we could have wished, are sufficiently near the truth for practical purposes; at any rate, it was not the method of combustion used which caused their relatively high values (+ 0·37 and − 0·23 milligrammes in CO_2, or + 0·1 and − 0·06 in C.)

We next tried oxide of copper instead of chromate of lead. The result was that the oxide, although it contained carbonic acid after having been kept for a long time, even in a glass-stoppered bottle, readily gave up its carbonic acid on ignition in a muffle, and then, when carefully preserved, remained all safe for a week or fortnight at least.

Unfortunately, Dr. Frankland's lecture on water analysis [*Chem. Soc. Journal* for 1876, p. 825],* in which he recommends oxide of copper instead of chromate of lead, without saying why he made the change—for he prescribed the use of chromate in his original memoir, and again in his paper in vol. vi. of the "Rivers Pollution Commission," came to hand only after we had finished our work, or it would have saved us a considerable amount of trouble.

On looking back upon our experiments now, it strikes us that the loss of time, and the trouble involved in our method of carbon determination could probably be reduced to a minimum by something like the following *modus operandi*:—Take a combustion tube wide enough to accommodate a conveniently-sized platinum boat; carge it with (1) a spiral of silver† wire gauze, (2) a layer of granulated oxide of copper, and after having attached our water-absorption apparatus (of which the V-shaped part should be charged with a solution of chromic acid in 60 per cent. sulphuric, to absorb the sulphurous acid that must be expected to come over), heat the silver and oxide of copper to redness in a current of carbonic acid free air, until the air as it comes out no longer precipitates baryta water. Now introduce the boat charged with the water residue, attach the tared soda-lime tube, and execute the combustion as usual. At the end of the analysis the tube would be ready for another combustion.

Determination of the Organic Nitrogen.

In the execution of this determination one of the difficulties to be overcome is the thorough elimination of the nitrogen of the nitrates and nitrites. In regard to this problem we are glad to be able to confirm the experiences of Drs. Frankland and Armstrong, and to say that we found their method to work satisfactorily (evaporation with sulphurous acid and a little iron-salt). This point being settled, it seemed to us that the determination of the organic nitrogen of a water might easily be effected in the following manner:—Starting with, say, half a litre of water, boil it down in a pear-shaped flask connected with a Liebig's condenser (taking care to avoid overheating the empty part of the flask), and "Nesslerize" the ammonia as it comes over. With a little experience, it is quite easy in this manner to concentrate the water to about 25 cubic centimètres without overheating any of the dissolved matter. We may also give it here at once as the result of our present experience that the ammonia is all contained in the first 100 to 150 cubic centimètres of distillate. After having thus got rid of 19-20ths of the water, add the requisite quantity of sulphurous acid and ferric chloride, and, if necessary, something to give body to the residue—we usually employed sulphate of potash; complete the evaporation with the necessary precautions on a water-bath, burn the residue with soda-lime, collecting the ammonia in highly dilute hydrochloric acid, and determine it colorimetrically according to Wanklyn and Chapman.

When we proceeded to rehearse this method, our difficulties with chromate of lead were still fresh in our memory, and we were, therefore, not over-much surprised that even when we worked upon pure ammonia-free water, or solutions in such water of small quantities of nitrate of potash, the distillates obtained on combustion contained very appreciable quantities of ammonia. We shall not trouble the reader with an account of the many experiments we made to ascertain the source of this ammonia. Suffice it to state that we succeeded in almost absolutely eliminating the error by an improved construction of our water-bath, and by a peculiar modification of Varrentrap and Will's method of nitrogen determination. Our water-bath may be shortly described by saying that it is a slight modification of Dr. Bischof's well-known apparatus, from which, in fact, it essentially differs only in this—that the steam is sent back into the boiler by an inverted condenser, and that the basin is connected with the bath by means of a mercury valve, so that, although the steam strikes directly against the basin, none of it can get into contact with the contents of the basin, which is, nevertheless, directly heated by the steam, and consequently maintained at the highest possible temperature. The mercury valve worked most satisfactorily; but we do not describe it because we used it merely as a makeshift, to be replaced by a solid metal joint—*i.e.*, a conically-ground ring of brass cemented to the basin, and fitting into a corresponding conical socket on the bath. Our evaporating apparatus stood in a separate room, not communicating with any other room, and by observing certain obvious precautions we easily avoided the breathing of mercury vapours, which, in fact, as long as the bell-jar is in its place, cannot get into the laboratory; but, after all, mercury vapours are not to be trusted, and had better not be produced unnecessarily.

Our method of combustion consists in this—that we place the water residue in a large copper or silver boat, moisten it with a drop of water, place on it about 3 grammes of a fused mixture of equal weights of pure baryta ($Ba(HO)_2$)‡ and sodium-soda, and, after having introduced the boat into a short combustion-tube by the exit end, with an absorption apparatus charged with highly dilute hydrochloric acid water, very gradually heat the boat—ultimately to dull redness—in a current of hydrogen, when the nitrogen is all eliminated as ammonia, which is easily measured with a sufficient degree of exactitude by means of Wanklyn's colorimetric method.

Before actually using the combustion apparatus it is indispensable to heat the empty tube with the absorption apparatus attached in a current of hydrogen until every trace of ammonia which stuck to the surface of the tube, the cork, &c., is expelled, and then to let it cool down in a slow current of hydrogen. It is also necessary to determine once and for ever the amount of ammonia which the working quantity of soda-baryta used in each analysis gives up when burned with, say, a few milligrammes of sugar or mannite. This ammonia—which, with pure preparations, will not amount to more than one to two hundredths of a milligramme—must be deducted from the ammonia found in our analyses as a constant error.

In proceeding now to give what evidence we have to offer of the exactitude of our method, we should begin by reporting a number of blank experiments made with pure water, which, with us, means distilled Loch Katrine water freed from its ammonia by fractional re-distillation with a pinch of carbonate of soda. But we think it will suffice to say that although in all cases the "organic ammonia found, instead of being = 0, amounted to something measurable by Nessler's reagent, we found it easy, by careful work, to bring down this quantity to one or two hundredths of a milligramme.* But let us now pass to our analyses:—

1. 12·9 milligrammes of hippuric acid, weighed out dry and burned with soda-baryta, gave a quantity of NH_3, of which one-tenth, when Nesslerized, was found in two experiments to amount to 0·12 milligramme of ammonia. The formula demands 0·12.

2. 50 milligrammes of nitrate of potash, dissolved in 200 cubic centimètres of pure water, alkalinized with caustic soda until the distillate showed nothing with Nessler—residue evaporated with 45 cubic centimètres of aqueous sulphurous acid and a few drops of ferric chloride—obtained, on combustion, 0·03 milligramme ammonia (NH_3) instead of 0·00.

3. A similar experiment with nitrate of potash = 10 milligrammes of ammonia, and hippuric acid = 0·10 milligramme of ammonia gave 0·18 milligramme of ammonia—*i. e.*, 0·08 milligramme too much. (A failure.)

4. Nitrate of potash = 5 milligrammes of ammonia, hippuric acid = 0·10. Found, 0·15 milligramme of ammonia. Excess found = 0·05 milligramme, which is rather more than can be tolerated.

5, 6, and 7. Experiments with artificial waters. *Modus operandi*:—650 cubic centimètres of pure water distilled down to 500—the residue now absolutely free from ammonia—charged with known quantities of nitrogenous materials, and free and organic ammonia determined.

In experiment 5 there were added known quantities of sal-ammoniac, sulphate of quinine, and nitrate of potash. Results:—

	Free NH_3.	Organic NH_3.	Nitric NH_3.
By synthesis	0·10	0·100	0·017
By analysis	0·10	0·095	—

In experiment 6 the substances used were sal-ammoniac, nitre, and urea. Results:—

	Free NH_3.	Organic NH_3.	Nitric NH_3.
By synthesis	0·05	0·140	0·17
By analysis	0·05	0·162	—

In experiment 7 the substance used consisted of urine solids diffused throughout a large body of sulphate of potash; 1·0115 grammes of this mixture, when burned with soda-lime in the ordinary fashion, gave 0·0488 gramme platinum = 8·41 milligrammes ammonia—*i.e.*, 8·31 milligrammes ammonia per gramme; 28·1 milligrammes of these dilute urine solids were dissolved in half a litre of absolutely pure water, prepared as in Nos. 5 and 6, and the water analyzed. "Free ammonia" in the several fractions of distillate (each = 50 cubic centimètres) was found to be—

First.	Second.	Third.	Fourth to Ninth.	Total.
0·013	0·004	0·001	Nil.	0·018

"Organic ammonia," as found by combustion, amounted to 0·225, hence "total ammonia" = 0·243 milligramme. The above analysis demands 0·233 milligramme.

It is surprising to see the very slight extent to which the urea was decomposed in the course of such a protracted distillation with an immense quantity of water, and notwithstanding the presence of those other urine constituents which usually are supposed to deprive urea of its stability against water. No doubt part of the 0·018 of our "free" ammonia really did come out of ammonia salts; hence about 95 per cent. of the urea survived the distillation.

It seemed to us interesting to see what would come of the application of Mr. Wanklyn's method to such an artificial water. We accordingly dissolved 29·5 milligrammes of dilute urine solids in 500 cubic centimètres of absolutely ammonia-free water, and next distilled off 300 cubic centimètres for the determination of the "free" ammonia. In the remaining 200 cubic centimètres the "albuminoid" was determined by means of alkaline permanganate, as prescribed by Mr. Wanklyn in his book. The results were—

Free ammonia, 0·021.

Albuminoid ammonia (in the several fractions of distillate)—

Fifty Cubic Centimètres of Distillate.

First.	Second.	Third.	Fourth.	
0·042	0·0075	0·015	0·02	
In all				0·085
A blank experiment with the reagent and pure water gave				0·007
Albuminoid corrected				0·078

Reducing to 28·1 milligrammes of dilute solids, and combining with No. 7, we have:—

Free NH_3.	Albuminoid.
0·018	0·074

The total organic NH_3 (according to No. 7) is 0·225—*i. e.*, above three times the albuminoid.

To be able to supply exact data as to the amount of time required for executing a nitrogen determination according to our method, we timed one of the analyses of artificial waters. We commenced work at 10.30 a.m. The "free" ammonia was determined and the residue ready for combustion by 1.30 p.m., and the combustion finished and the ammonia Nesslerized by 2.10; that is to say, the whole of the analysis was done in less than four hours, which compares very favourably with Dr. Frankland's process. With regard to the degree of exactitude attainable, the latter process, no doubt, is superior to ours in those cases in which the quantity of nitrogen present is large—as, for instance, in the analysis of sewage or positively foul waters; but these are precisely the cases where a relatively high degree of precision is uncalled for. Passing to the more important case of a water which is not positively bad, we feel sure it will be admitted that our process, even in point of precision, is far ahead of Dr. Frankland's; besides, it enables one to measure quantities of ammonia, which, if given as nitrogen gas, would be barely visible in a eudiometer.

After what we said in the introduction, we need not specially state that we do not mean our process of nitrogen determination to supersede Mr. Wanklyn's albuminoid ammonia process. We should be sorry to see that process fall into abeyance, because, whatever may ultimately turn out to be its real value, no doubt it is a step in the right direction—in that direction, in fact, in which the science of the subject will progress, if it is to advance at all.

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* See also JOURNAL, vol. xxviii., pages 53, 91, 130.

† A German chemist, whose name we forget, found some years ago that red-hot silver reduces nitrogen oxides as effectively as copper does; of course, without itself suffering permanent change.

‡ Why the baryta? Well, soda alone would probably do. We originally intended to effect the fusion in the tube itself, and added the baryta to moderate the action of the baryta on the glass. And as we had a stock of the mixed reagent on hand, we used it. It fuses at a remarkably low temperature, and, in an atmosphere of hydrogen, does not act much even on copper.

* In the analyses given below this purely adventitious ammonia is not allowed for; we prefer giving the numbers as we found them.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Nothing further has transpired during the week as to the intentions of the coalowners with respect to the enforcement of the reduction in wages which they have proposed. It is thought probable, indeed, that nothing more will be heard of the matter, now that signs of an improvement in the house coal trade are beginning to be felt. On the other hand, the demand for fuel for manufacturing purposes continues so light, that the coal merchants and others allege that something must be done at once,

and that if some of the pits are not wholly closed there is no alternative but a reduction of wages. Works which in brisk times use 1000 tons of coal daily, are now scarcely burning 200 tons in the same time, so that it is clear that matters are at a very low ebb indeed. In the lighter industries of the town and district there is some change for the better, but the iron trade seems to be as bad as ever, and to have no immediate prospect of improving. The same state of things prevails in the cast steel branches, so that with two of the great staple trades so thoroughly depressed, it is not difficult to account for the unparallelled dullness of commercial affairs. The smelters are doing what they can to limit production, and to push sales, but their success in the latter respect is not great, owing to the wretched demand for most sorts of finished iron, and the keen competition of the Cleveland and Staffordshire houses. Prices are, consequently, purely nominal, and any lot of respectable size can be negotiated at something under the list prices. Many houses, in fact, have discontinued the issue of circular quotations, and "take their chance" at any likely figures. For some Derbyshire brands I hear of, not very large lots have been sold at about 1s. per ton under the terms which prevailed last week.

Fuel prices are weak, and the supply is most abundant in all directions.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Business this week, so far, at least, as the Manchester market is concerned, has been considerably interfered with by the festivities in connexion with the opening of the new town hall, but apart from this there is no very material change to notice with regard to the coal trade of this district. In the Manchester market a slightly steadier tone is maintained, but throughout Lancashire generally trade continues very dull. The gas coal trade, which, so far as sellers are concerned, has been of an unsatisfactory character all through the season, is very languid, and it is evident that a good many consumers are disposed to trust to the market for the supply of a considerable portion of their forward requirements. At least, such is the inference to be drawn from the large quantity of gas coal which is still unplaced in this district, and which is being offered at very low prices. In house fire classes of coal there is still but little doing, and inquiries for winter stocks are not yet coming into the market to any extent. Common classes of coal continue a drug, and are likely to remain so until there is some improvement in the iron and other branches of trade, the prospects of which are as yet very remote. Engine classes of coal do not move off quite so readily as they did, and although for the better sorts there is still a very fair demand, common sorts are plentiful in the market. Prices show no material change, the average quotations at the pit mouth ranging at about 10s. per ton for good Arley, 8s. 6d. to 9s. for common, 8s. to 8s. 6d. for Pemberton four-feet, 6s. to 7s. for common coal, 5s. to 5s. 6d. for burgy, and 3s. 6d. to 4s. 6d. for slack, according to quality. There is, however, a want of firmness in the market, and good orders for immediate delivery are accepted under current rates.

The iron trade shows no improvement. Values have not given way any further, but there is still very little business doing; the low prices now ruling in the market apparently offering no inducement to consumers to venture on speculative purchases, and the few orders which are given out are mostly for small parcels to cover immediate requirements. Lancashire makers of pig iron, notwithstanding they are now offering at considerably below the cost of production, are only securing orders sufficient to keep a very small portion of their plant in work, and are unable to move the heavy stocks which have accumulated on their hands. Finished iron is also in a very depressed condition, very few of the works being employed more than half time, and Lancashire bars delivered into the Manchester district are offered at £6 10s. to £6 12s. 6d. per ton.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The shipments of all classes of coal from the Tyne were a little better last week than the previous one. Some of the collieries producing best gas coals are doing a fair business, but others are only transacting a very meagre trade. Prices, except for best coals, have, as a rule, given way from 6d. to 9d. per ton, and a good few collieries have only made poor time. There was a meeting of the Northumberland Coal Owners and Miners Committee at Newcastle on Saturday, when they discussed the present position of affairs. An agreement was arrived at that the recommendations made by Mr. Herschell, Q.C., in his recent award for a better system of working the Northumberland pits, should be carried out. There are a couple of strikes in the Durham coal trade, but they in no way interfere with gas.

The demand for tonnage is very little better. A few more coasting orders are coming forward. Baltic orders are slightly better; but the Mediterranean market is still depressed. The present rate to London is 4s. 3d. per ton for steamers; Havre, 5s. 7½d. to 5s. 9d.; Dieppe and Antwerp, 5s. 8d.; Rouen, 7s. The coal trade to Cronstadt seems to be stopped, and merchants are a little anxious as to getting pay for the quantity of coals they have sent there.

The Cleveland iron trade was decidedly better last week. Prices were firmer on 'Change at Middlesbrough. An advance of about 3d. per ton was established. The shipments of iron are active just now, and a good deal of railway plant is being sent out to the famine districts of India.

The chemical trade is quiet. General business is very dull.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The directors of the Kirriemiur Gas Company have just appointed Mr. Rollo, of Perth, as the manager of their gas-works, in succession to Mr. Adams, who will shortly leave Kirriemiur to enter upon his duties at Pollokshaws, near Glasgow, to which he was elected a few weeks ago.

At a meeting of the Tillicoultry and Devonside Gas Company, held last Thursday, it was resolved to reduce the price of gas 10d. per 1000 cubic feet—from 7s. 6d. to 6s. 8d. Great praise is being awarded to Mr. F. Scott, the manager of the works, for the energy and efficiency which he has displayed in the performance of his duties, and the reduction in price just effected is largely attributed to his efforts.

The annual general meeting of the Carnoustie Gaslight Company was held last Wednesday afternoon—Mr. John Borrie in the chair. From the annual report of the directors, which was laid before the meeting and approved of, it was shown that the company's affairs were in a very prosperous condition. A dividend at the rate of 7½ per cent. upon a capital of £5000 was declared, and it was resolved that the price of gas be reduced from 6s. 8d. to 5s. 10d. per 1000 cubic feet. It was stated that the directors had resolved, in the event of the inhabitants of Carnoustie putting up additional lamp-posts, to supply the gas free. This resolution was approved of by the meeting.

At their ordinary meeting held on Monday, the 10th inst., the Police Commissioners of Broughty Ferry had the price of gas under consideration. Mr. W. C. Norrie, in moving the adoption of the committee's recommendation to reduce the price of gas 5d. per 1000 feet—viz., from 5s. to 4s. 7d.—said that the data they had for so doing was a surplus of £361 of profit on last year's accounts. Mr. Philp did not think they would have £361 of profit if they deducted bad debts, £88 for interest on the new gasholder, £60 additional for the proportion of rise of salaries, and £50 for new offices, and after deducting these he questioned very much whether they would be in a position to reduce the price of the gas. Mr. Scott said it was a very strange statement for Mr. Philp to make, as from it, it would seem as if the committee had been very careless in making the proposal to reduce the price of the gas 5d. per 1000 feet. Mr. Philp would make them believe that 5d. should be added instead of taken off the price. The £50 for rent mentioned by him was certainly never contemplated by the committee. They could hold their meetings in their own premises if it came to that. If the committee in a previous year were warranted in reducing the price 10d. per 1000 feet on a surplus of some £400 odd, surely the present committee were safe enough, with a balance of £361, in reducing the price 5d. per 1000 feet. Mr. Norrie held that Mr. Philp took too gloomy a view of the matter, and said he would not be afraid to reduce the price in the face of all the arguments used against it. With the increased consumption, and the new appliances introduced for the manufacture of the gas, he had no fear of the result; and even supposing they were £100 or so behind next year it would not be a great matter. Mr. Lawrie reminded the meeting that the committee's recommendation was in accordance with the interpretation of the Act, for according to it, the commissioners were prohibited from making profit on the gas, and were bound to reduce the price. They had a surplus of £361 over last year, and he maintained that the only use they could put it to was the reduction in the price of the gas. Mr. Philp mentioned they had £59 of bad debts, and he thought there should be no bad debts. Mr. Norrie observed that if Mr. Philip could collect all their accounts and have no bad debts he ought to get an annuity. He seconded the motion that the committee's recommendaton be approved of, and no amendment being proposed, it was agreed to.

The extensions which have been in progress at the Coupar-Angus Gas-Works for a few months back have now been completed, and are likely to prove in every way satisfactory. Mr. M'Crae, of Dundee, who has acted as the consulting engineer for the works, made an official inspection of the new tank and gasholder about ten days ago, and expressed himself highly pleased with the manner in which both contracts had been executed. The tank is 41 feet 6 inches in diameter, by 11 feet in depth, substantially built of ashlar work, and made water-tight at the bottom by a sufficient depth of concrete. The gasholder is 40 feet in diameter, by 14 feet in depth to the apex of the crown, which is convex in shape. It will contain 16,500 cubic feet of gas. The gas was admitted into the holder last Tuesday, by Mr. J. Paterson, chairman of the company.

At the first ordinary meeting of the directors of the Coatbridge Gas Company, incorporated 1877, which was held last week, it was resolved to increase the price of gas from 3s. 9d. to 4s. 2d. per 1000 cubic feet. This resolution was come to by the directors very reluctantly, but as the capital of the company has been increased from £7590 to upwards of £20,000, it was deemed a necessity that an advance of price should be made in order to provide a suitable interest upon the capital invested. Even at the advanced price, Coatbridge is no worse off in respect of the cost of gas than many of the large provincial towns of Scotland, such as Dundee, Paisley, Kirkcaldy, Perth, and Stirling, in all of which the price is also 4s. 2d. per 1000 cubic feet. Still, the main fact involved will be regarded by many persons as a movement in the wrong direction. The only other instance that I can remember of an advance in the price of gas being made in Scotland this season is that of Forfar, which I mentioned recently, in which case, however, the price was advanced 10d. per 1000 cubic feet, whereas at Coatbridge the increase is only one-half that amount. I understand that the new works at Coatbridge are progressing satisfactorily, although not as rapidly as could be wished, the weather during the past few months having been so unsuitable for operations of the kind required in the erection of gas-works. It is expected, however, that one of the gasholders will be in operation early in November.

The Police Commissioners of Govanhill, a new burgh recently formed in the southern suburbs of Glasgow, have resolved to erect about 120 new lamps upon the thoroughfares within their jurisdiction, at a cost of £2 2s. 6d. each, including the opening and closing of the ground for the necessary connexions with the street gas-mains. The whole of the burgh will thus be well lighted, it is thought, in about a couple of months.

It has just been resolved by the Police Commissioners of Lochgelly, in Fife, to take over the street lamps recently erected by public subscription in the burgh, and to have them lighted about the beginning of the ensuing month.

The Edinburgh and District Water Trustees have fixed the following water-rates:—Domestic, 7½d. per £1; shop rate, 2d. per £1; public rate, 1d. per £1. The supply of water during July and August, in Edinburgh, was 29·0 gallons per head per day, to a population of 229,872; in Leith, 28·2 gallons, to a population of 50,870; in Portobello, 28·8 gallons, to a population of 6058.

It has been resolved by the Forfar Town Council to open a cash credit account for £1500, to provide for the preliminary expenses of the proposed Water Bill.

The water and drainage works of the Burgh of Innerleithen are rapidly progressing, and the commissioners have borrowed the sum of £5500 for the works, repayable by instalments on favourable terms.

The Town Council of Rutherglen, finding that the town is progressing more rapidly than is provided for by the water-supply arrangements of the Glasgow Water Commissioners, are going in for a scheme of their own.

The Glasgow pig market has been less firm during the past week, and on Friday the prices were 3d. down, as compared with those of the previous Friday.

No change of any importance can be reported regarding the coal trade, either as to demand or prices.

ABANDONMENT OF THE PROPOSED PURCHASE OF THE HULL GAS-WORKS BY THE CORPORATION.—At the meeting of the Parliamentary Committee of the Hull Corporation on the 8th inst., the question of the gas supply being in the hands of the town, having been referred by the council to the committee, Mr. Elam moved, and Alderman Wells seconded, "That it is desirable to go to Parliament next session for power to purchase existing works, erect new ones, or contract for the supply of gas." As an amendment, Alderman Lambert moved, and Mr. Spurr seconded, "That, looking to the large increase of the rates, and to the sums required to carry out the various improvements under the consideration of the council, and to the fact that a new mode of lighting public streets of towns is on trial at Winchester, Romford, and other places, this committee is of opinion that it is not expedient to interfere in the matter during the coming session, and, therefore, wait for further instructions from the council." The amendment was carried by four to two votes.

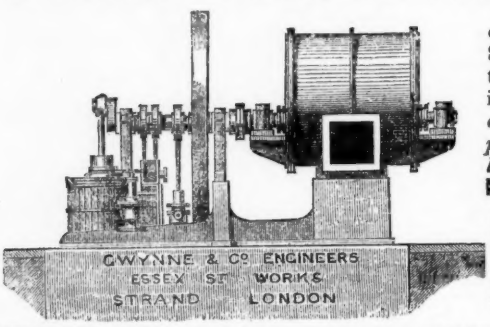
GAS EXPLOSION IN LIVERPOOL.—An explosion of gas of a most alarming nature occurred in Liverpool on Wednesday last, but fortunately it was not attended with any very serious consequences. The explosion took place in Feather Street, off Richmond Row, about two o'clock, and its force may be judged by the fact that the stone covering one of the man-

holes there, which weighed about 4 cwt., was blown into the air some distance. A number of paving stones and gravel were also scattered about in all directions. A police-constable states that about the time mentioned, while standing in Richmond Row, he heard a loud noise in the direction of Feather Street, and on proceeding to the place he ascertained that an explosion of gas had taken place, blowing up the street in two places. One stone, weighing about 4 cwt., had evidently been sent into the air some distance, as he found it broken in two. Mr. Goldstraw, one of the borough surveyors, was sent for, and, assistance having been procured, a workman was sent down one of the man-holes. He shortly afterwards reported that the sewer was full of flames nearly as far as he could see. A police-constable was at once despatched to the office of the gas company, and, after the lapse of some time, one of the men discovered that the explosion had been caused in consequence of a serious leak from the main. This was stopped, and the flames were extinguished. It is said that Mr. Hedley, a coffee roaster, Feather Street, had for several days perceived a strong smell of gas on his premises, and he communicated with the officials at the offices of the gas company with respect to the matter. It is supposed that the explosion was caused by a lighted match which had been thrown down the sewer by some passer-by. No material damage was done beyond that stated, with the exception of the breakage of a few windows in the immediate neighbourhood by the flying stones and force of the concussion.—*Liverpool Mercury.*

PUBLIC LIGHTING IN BRISTOL.—The existing contract between the sanitary authority and the gas company for the lighting of the public lamps expires on the 29th inst., and no arrangement has as yet been made for the continuance of the service, the sanitary authority considering that the price asked in the new tender is excessive, and the gas company refusing to concede more favourable terms. In view of this contingency, the sanitary authority have been instituting inquiries in places where gas has been superseded by petroleum for the lighting of the public streets, and some experiments which Mr. Kitt, the city engineer, has made with three patent gas oil lamps, are said to have been attended with very satisfactory results. The committee of the sanitary authority, at their meeting on Thursday last, resolved to advertise for tenders for lighting the whole or part of the city otherwise than by coal gas, unless satisfactory arrangements could be made with the gas company, and a deputation was appointed to wait on the directors of that company to see if better terms could be obtained. The interview took place on Friday, and we are informed that the gas company resolutely maintained their position, and that no settlement of the difference resulted from the conference. There are in the city 4019 public lamps, 3419 of which are fitted with burners consuming 5 feet of gas per hour. The lamps having these burners, it will be seen, are a very large proportion of the whole, and for these the city paid £3 10s. per annum until 1874, when a new contract was made, and in consequence of the great increase in the cost of coal, the price per lamp was raised to £4 4s., this increase of 14s. making an advance upon the contract of £2343. One of the conditions of the contract, however, was that when the price of gas was reduced to the private consumer, two-thirds of such reduction should be conceded in respect of the charge for lighting the public lamps. In pursuance of this condition the price was reduced in 1876 from £4 4s. to £3 17s. 4d., and in 1877 to £3 14s.; but though these reductions amounted to 10s. per lamp, the price charged was still 4s. per lamp in excess of that charged prior to 1874, when the cost of producing gas was materially affected by the sudden rise in the coal market. The gas company, at their meeting last Thursday resolved to reduce the charge to the private consumer 3d. per 1000 feet, and, in the new tender which they made to the sanitary authority, conceded two-thirds reduction in accordance with the terms of the existing contract; the reduction of 2d. per 1000 feet representing a sum of 3s. 4d. per lamp, making the charge £3 10s. 8d., or 8d. per lamp in excess of the contract when the coal market was, as it is at present, in a normal condition. The sanitary authority decline to be bound in the new contract by the terms of the existing contract, and ask that the same reduction should be made to the city as has been made to the private consumers—viz., 3d. per 1000 feet. That would bring the price per lamp per annum to £3 9s., so that in point of fact the difference between the two bodies is 1s. 8d. per lamp per annum. There the matter stands at present, neither party feeling disposed to give way, though it should be stated that the gas company offered to tender at the prices they had named for a period of three years instead of six years, as stated in their tender.—*Bristol Mercury.*

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

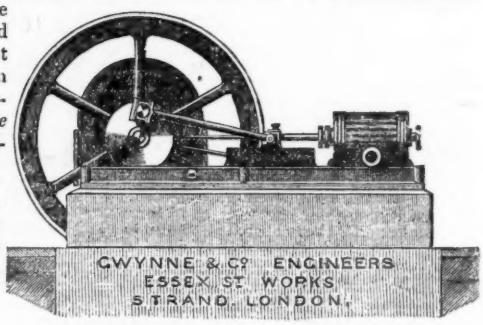
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure. Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

☞ *G. & Co. are now making 6 Sets Exhausters and Engines for 105,000 cubic feet per hour, 3 Sets 180,000 Exhausters and Engines, with many others of all Sizes.*

NOTICE OF REMOVAL.

D. BRUCE PEEBLES & CO.

Beg to announce that they have REMOVED to their New Premises.

TAY WORKS, BONNINGTON, EDINBURGH,

To which all communications should now be addressed.

May 30. 1877.

WANTED, a Retort-House Foreman for a Metropolitan Gas Company.

Applications, by letter, addressed No. 399, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FLEETWOOD GAS-WORKS.

WANTED, a steady, respectable Man as STOKER. Wages 23s. per week. None need apply unless having held a similar office.

Apply to R. SHADBOLT, Manager, Gas-Works, FLEETWOOD.

TO GAS-FITTERS.

WANTED, a steady, industrious Man as GAS-FITTER, &c. One who has had experience in Gas and Water Works preferred.

Applications, stating age, where last employed, and wages required, in own handwriting, to be made to the MANAGER, Gas-Works, BLAENAVON.

WANTED, an energetic Man to MANAGE a small Gas-Works in the Country. One Retort in summer, and two in winter. State wages and age, with copies of testimonials.

Address GAS, Messrs. Deacon's, 154, LEADENHALL STREET, E.C.

TO GAS-FITTERS.

WANTED, a Fitter for a medium-sized town in the West Indies. He must be well up both in compo' and iron-pipe fittings. Good character indispensable.

Apply, with testimonials, to Ventura and Cabrera, 18, Coleman Street, LONDON, E.C.

TRURO GAS COMPANY.

WANTED, by the above Company, a thoroughly practical Man as a GAS-FITTER. One who understands bronzing and lacquering would be preferred.

Applications, enclosing testimonials, with references, and stating wages expected, to be addressed to the Secretary, Mr. J. HAMILTON.

Dated, Truro, Aug. 30, 1877.

WANTED, the Address of Gas Officers who have not received a Copy of the New Edition of PAMPHLET for GAS COMPANIES to distribute to their Gas Consumers—"Cooking and Heating by Gas." A Copy will be sent free—extra Copies by post Threepence—direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

GASHOLDER FOR SALE.

ONE Telescopic Gasholder, 70 feet by 20 feet, complete, with cast-iron tank, columns, girders, and inlet and outlet pipes, valves, &c., of modern construction. In first-class condition, and made by Messrs. Pigzott and Co., of Birmingham.

To be seen at work at the Gas-Works, Birkenhead.

Cause of removal to make room for extensions.

To be sold a bargain, taken down, and re-erected ready for work.

For particulars, apply to Messrs. ASHMORE AND WHILE, STOCKTON-ON-TEES, or to view to Mr. GALLOW, Gas Engineer, BIRKENHEAD.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

FOR SALE—One Exhauster by Jones, of Birmingham, capacity 25,000 feet per hour, with bye-pass, 12-in. inlet and outlet pipes and valves complete, in first-class working condition, price £40; also one Exhauster Regulator, with chain and weights complete, price £5.

Apply to CLAPHAM BROS., Ironfounders, &c., Keighley, YORKS.

THE BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given that the HALF-YEARLY GENERAL MEETING of the PROPRIETORS of this Company will be held at this Office, on WEDNESDAY, the 26th inst., at One o'clock precisely, to transact the usual business, to declare the Dividend for the half year ending the 30th of June last, and to elect two Directors and one Auditor, in the place of those who go out by rotation, but who are eligible to be re-elected.

Notice is hereby also given that the Transfer Books of the Company will be closed on the 14th, and re-opened on the 27th inst.

By order of the Court of Directors,
FREDERIC LANE LINGING, Secretary.

Chief Office, No. 11, George Yard,
Lombard Street, London, E.C., Sept. 5, 1877.

P.S.—Any qualified proprietor intending to become a candidate for either of the above-mentioned offices is required to signify the same by a written notice under his hand, to be left at the Office of the Company twelve days at least previous to the 25th inst.

TO BE SOLD CHEAP, a Horizontal STEAM-ENGINE of six-horse power, and Cornish Boiler 4 ft. 9 in. diameter and 8 ft. long, either together or separately.

The above have not been fixed since they came from the fitter's shop.

Apply to Mr. JOHN BUDDEN, Manager, Gas-Works, Poole, DORSET.

TOTTENHAM AND EDMONTON GAS-LIGHT AND COKE COMPANY.

NOTICE is hereby given that the ANNUAL ORDINARY GENERAL MEETING of the PROPRIETORS in the Company will be held at the Works, Willoughby Lane, Tottenham, on SATURDAY, the 29th day of September inst., at Three o'clock in the afternoon precisely, to receive the Report of the Directors, to declare a Dividend to the 30th of June last, and for the election of Two Directors and an Auditor for the ensuing year, Messrs. John Liddle and John Malcolm being the Directors, and Mr. Hugh Hercus, the Auditor, who retire by rotation, and, being eligible, offer themselves for re-election; and for transacting such other business as the Act of Parliament directs.

The Transfer Books will be closed on Friday, the 14th inst., until after the meeting.

The Dividend to be declared will be payable on and after Monday, the 1st of October Next.

By order,
JAMES RANDALL, Secretary.

Offices, Edmonton, Middlesex,
Sept. 13, 1877.

Now ready, price One Shilling, No. 10 *(to be continued Monthly) of*

A TREATISE ON THE SCIENCE & PRACTICE OF THE Manufacture and Distribution OF COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed, at the cost of 1s. 2d. Monthly, or 7s. for the Half Year.

Now ready.

THE GAS & WATER COMPANIES DIRECTORY FOR THE YEAR 1877,

EDITED BY

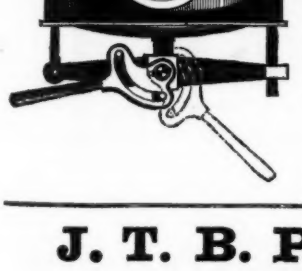
CHARLES W. HASTINGS,

8, BUCKINGHAM STREET, ADELPHI, LONDON, W.C.

THIS WORK IS UNDER THE PATRONAGE OF ALL THE LEADING GAS & WATER ENGINEERS AND SECRETARIES OF THE METROPOLITAN & PROVINCIAL COMPANIES.

Price 5s. in Cloth Covers; by post, 5s. 2d. | Price 3s. 6d. in Paper Covers; by post, 3s. 8d.

PUBLISHED BY MESSRS. MARCUS WARD & CO., OF LONDON AND BELFAST.



STORER & PUGH'S PATENT RETORT-LID FASTENINGS

Have now stood the test of experience, and have been found one of the greatest improvements in retort-house appliances yet invented. All who desire security and economy should give them a trial.

Prices and further particulars will be given on application to

J. STORER,
GAS-WORKS, STAFFORD.

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.
REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

SITTINGBOURNE DISTRICT GAS COMPANY.

THIS Company has been Incorporated by Special Act of Parliament, passed in last Session, intituled "The Sittingbourne District Gas Act, 1877," for the purpose of transferring the present Gas-Works (established 30 years) from Private Ownership to a Public Company, with powers to extend the supply. The Works have paid hitherto upwards of 10 per cent. The nominal capital of the Company is £30,000, in £20 shares, of which £22,000 only is required. About £17,000 of this has been subscribed locally, and the remaining shares are still open to the public at £2 10s. premium.

Applications to be made to Mr. W. J. HARRIS, SITTINGBOURNE.

COMMERCIAL GAS COMPANY.

NOTICE is hereby given that the next ORDINARY MEETING of the Commercial Gas Company will be holden at the Cannon Street Hotel, in the City of London, on FRIDAY, the 5th of October, 1877, at Twelve o'clock at noon, to receive the Report of the Directors, to declare a Dividend, and for other business.

The Books will be closed for the transfer of Stock from the 22nd of September inst. to the 5th of October next, both days inclusive.

By order of the Board,
E. J. SOUTHWELL, Secretary.

Offices, Stepney, Sept. 6, 1877.

GAS PLANT FOR SALE, suitable for Small Works:—

Seventeen 4-inch and 3-inch H-Pipes.
Eighteen 15-inch Circular Mouthpieces.
A 6-inch Governor.
A Station-Meter, to pass 6000 cubic feet per hour.
Scrubber and Washer combined; very good.
Vertical Condenser; very good.
Seven 7-feet lengths, 12-inch D-shaped Hydraulic Main.
Two Gasholders, each capable of holding 15,000 cubic feet.

Apply to the ENGINEER, Phœnix Gas Company, GREENWICH.

BLACKPOOL CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive TENDERS for—

No. 1 Contract.—The erection of a NEW RETORT-HOUSE, 140 feet by 60 feet.

No. 2 Contract.—Wrought-Iron ROOF for the above.

Plans and specifications may be seen at the Office of the undersigned.

Tenders, properly endorsed, to be addressed to the Chairman of the Gas Committee, and sent in by the 25th of September.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
JOHN CREW, Engineer and Manager.

Sept. 7, 1877.

THE SUSSEX CHEMICAL WORKS, NEAR SHOREHAM, WITH POSSESSION.

MESSRS. FULLER, HORSEY, SON, and CO., are instructed to SELL BY AUCTION, at the Mart, Tokenhouse Yard, on Thursday, the 27th of September, 1877, at One precisely, unless previously disposed of by private contract, the LEASE, PLANT, and MACHINERY of the Sussex Chemical Works, together with the Contracts and Goodwill.

The property is situate opposite Kingston-by-Sea, in the Parish of Lancing, on the river Ardur, close to the mouth of the Harbour, and occupies an area of about 2½ acres. The Buildings comprise Brick-built Boiler-House, 32 ft. by 25 ft.; lean-to in rear; Brick and Timber built Ammonia Shed, 50 ft. by 28 ft; Lime-Shed; Brick-built Laboratory; Smith's Shop; Anthracine Shed, 52 ft. 6 in. by 25 ft.; Store-House, Pitch-Chamber, Pitch-Bed, Spacious Yard, Timber Pontoon, and Landing Stage.

The Plant and Machinery includes five wrought-iron Stills, with 13-lb. lead-lined absorbers, brick seatings, furnace work and chimneys; Three Tar Stills (two 1500 and one 2400 gallons), with brick seatings and chimney stacks and condensers; Five Steam-Pumps; Two Cornish Steam-Boilers; Four lead-lined Dipping Vats; Range of 52 Anthracine Straining Bags; Hydraulic Press, with 10-in. ram and pumps; Iron Store Tanks, and the necessary Plant for carrying on the distillation of Tar and the manufacture of Suphate of Ammonia.

There is a Wharf opposite on the bank of the river, having direct communication with the London Brighton and South-Coast Railway. Vessels of 200 tons can load alongside the Works. Contracts and agreements are running with the Brighton and neighbouring Gas Companies for the whole of their Tar and Gas Liquor on most favourable terms, and there are other contracts for Coals, Pitch, &c., all of which will be included in the purchase.

The property is held on lease for an unexpired term of about 18 years, at the very low rent of £32 per annum.

The loose Tools and Utensils, Trolleys, &c., to be taken by a purchaser at a fair valuation.

May be viewed till the sale, by orders which may be had of the Auctioneers.

Particulars may be had of G. T. HARE, Esq., Solicitor, 18, Old Broad Street, E.C.; of Messrs. INGLEDEW, INCE, AND GREENING, St. Benet's Chambers, Gracechurch Street, E.C.; of Messrs. C. BROWNE STANLEY AND CO., 25, Old Jewry, E.C.; of Messrs. COPE AND HARRIS, 8, Old Jewry, E.C.; at the MART; and of Messrs. FULLER, HORSEY, SON, AND CO., 11, Billiter Square, LONDON, E.C.

MR. HENRY GORE,

CONSULTING GAS ENGINEER AND SCIENTIFIC REFEREE,

OFFICE, 98, FLEET STREET, LONDON, E.C.

Plans and Specifications for every description of Gas Work. Specialities for Works in tropical climates. Arbitrations and Parliamentary Inquiries attended. Mr. Gore has had upwards of 30 years experience as a Gas Engineer in connexion with Works in nearly all parts of the World.

Now ready, price 5s., by post 5s. 3d., cloth, 8vo., gilt lettered,

SULPHUR COMPOUNDS IN GAS.

A full Report of the Evidence given before the Select Committee of the House of Commons on the Bills of The Gaslight and Coke Company and the Crystal Palace District Gas Company in the present Session.

LONDON:
WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, E.C.

TENDERS FOR TAR AND LIQUOR.

THE Directors of the Gloucester Gas Company are prepared to receive TENDERS for all the surplus TAR and LIQUOR produced at their new and old Works for One year, from the 1st of October next.

Delivery can be made at the old Works into boats in the Severn, and at new Works into boats in the Berkley Canal.

Any further information can be obtained by application to the Manager, to whom separate tenders for both or one must be delivered not later than the 2nd of October next.

R. MORLAND, Manager.

Gas-Works, Gloucester, Sept. 14, 1877.

THE Gas Committee of the Leeds Corporation are prepared to receive OFFERS for One STATION-METER, capacity 30,000 feet per hour, and One DRUM of similar capacity.

Also several Jones's EXHAUSTERS of various sizes, with engines, shafting, &c., complete. All in excellent condition.

Further information can be had on application to Mr. Woodall, Engineer.

Offers to be addressed to the Chairman of the Gas Committee, Town Hall, Leeds.

By order,
C. A. CURWOOD, Town-Clerk.

Leeds, Sept. 17, 1877.

THE Corporation of Middlesbrough are prepared to receive TENDERS for BUILDING a GASHOLDER-TANK, proposed to be erected near the North-Eastern Railway Goods Station, at Middlesbrough.

There will be plans showing two schemes—prepared by Mr. Richard Cail, of Newcastle, and Mr. George Livesey, of London, respectively—for building this Tank, and Contractors are at liberty to tender for either or both.

Plans and specifications are now ready, and may be seen at the Gas Manager's Office, Gas-Works, Middlesbrough.

Plans and specifications and quantities, showing Mr. Cail's scheme, may also be seen at his Office, 5, Dean Street, Newcastle-on-Tyne.

Tenders, endorsed "Tender for GAS-Tank," to be sent addressed to the Town-Clerk, not later than Thursday, Oct. 3, 1877.

It is to be understood that the Corporation do not pledge themselves to accept the lowest or any tender, nor will anything be allowed to parties tendering.

By order,
GEORGE BAINBRIDGE, Town-Clerk.

Corporation Hall, Middlesbrough,
Sept. 12, 1877.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

ENGINEER,
AND
CONSULTING GAS ENGINEER,
BARTON HOUSE, opposite BARTON ARCADE,
DEANSGATE, MANCHESTER.

ALFRED LASS,

SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9865 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

E. & W. H. HALEY,

General Ironfounders and Makers
OF
CAST-IRON GAS AND WATER PIPES.

Sizes 1¼ to 15 inches.

LISTER HILLS FOUNDRY, BRADFORD, YORKSHIRE.

GAS PURIFICATION.

BAILES & HALLSWORTH,
CONTRACTORS FOR THE
PURIFICATION OF COAL GAS,
BY THEIR
PATENT OXIDE OF IRON COMPOUND.

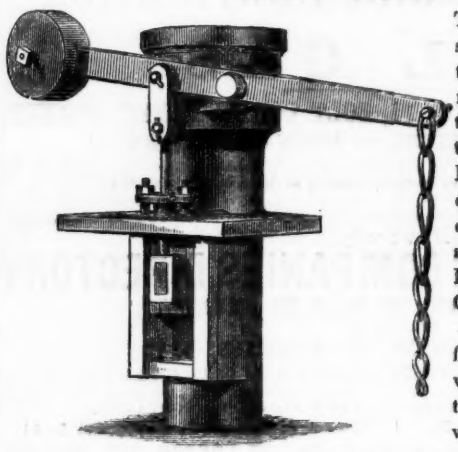
The material is in use at most of the principal Gas-Works in Yorkshire and elsewhere. It contains considerably less moisture than natural Oxide of Iron. It is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—

BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.

MOORE'S PATENT DIP-PIPE.

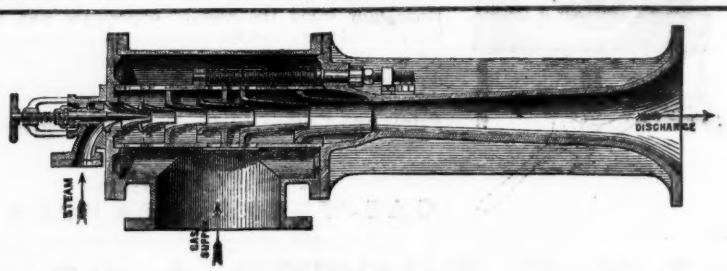


THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.

In ordering the Dip, the distance from top side of hydraulic main to water-level should be stated; also the Dip at which it is required to work when the valve is shut.

PRICES—3-in., 35s.; 4-in., 42s.; 5-in., 48s.

SOLE AGENT: J. GILL, GAS-WORKS, BRIDGENORTH,
To whom all communications should be addressed.
MAKERS: THE COALBROOKDALE COMPANY, SHROPSHIRE.



KÖRTING'S STEAM-JET GAS-EXHAUSTER.

IMPROVED CLELAND'S PATENT.

UPWARDS OF 250 IN USE.

CLELAND'S PATENT CONDENSER AND STEAM SCRUBBER.

FOR PARTICULARS, APPLY TO

KÖRTING BROS.,

17, LANCASTER AVENUE, MANCHESTER,
OR TO
GERALD J. TUPP, 8, John Street, Adelphi, W.C.,
LONDON,
SOLE AGENT FOR ENGLAND AND WALES.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

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DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,

STOURBRIDGE (Established 1834),

MANUFACTURER OF EVERY DESCRIPTION OF

Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts,

A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
	18 in. × 15 in.,	20 in. × 16 in.,	22 in. × 14 in.,	24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.

J. & J. BRADDOCK,

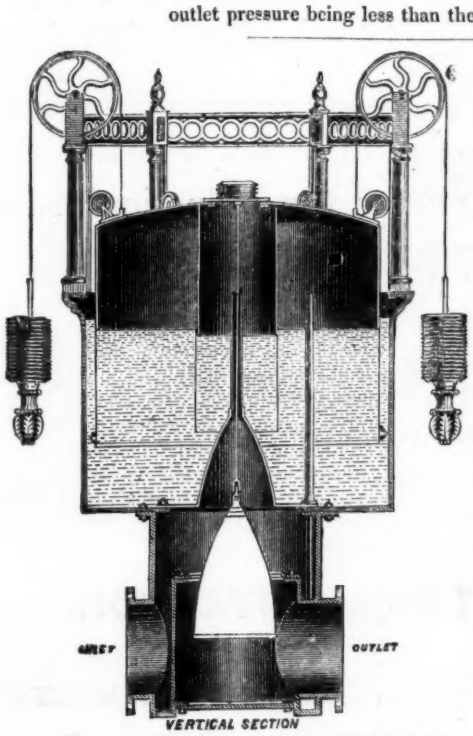
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

NOTICE.

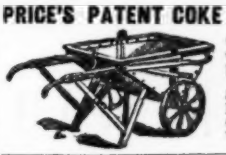
MESSRS. THOMAS DOCWRA & SON, Contractors, Balls Pond Road, hereby give notice that they have no business connexion with any other person of the same name.

GARSIDE'S IMPROVED MAIN DRILLING CLIP.

No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.
GARSIDE'S REGISTERED TUBE-VICE takes ¾ brass to a 2-in. Socket.
May be had direct from the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

CATHELS'S Patent Gas-Washer is an excellent cleanser of gas from tar, ammonia, sulphur, and carbonic acid, reducing the cost of subsequent purification 30 to 50 per cent. Needs no motive power or attention beyond drawing off and recharging as required. Has no moving parts or complications to get out of order. Is of moderate cost, and is practically indestructible.
Application to be made to the MANUFACTURERS, the Horseley Company, Tipton, STAFFORDSHIRE.

PRICE'S PATENT COKE & COAL BARROW



effecting a great saving of time, labour, and expense.
For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
SCOTSWOOD-ON-TYNE.

BOUCK & CO., LIMITED,
TAR DISTILLERS & MANUFACTURING CHEMISTS,
MILES PLATTING, MANCHESTER.

BUYERS OF COAL TAR,
And Crude Products therefrom,
AMMONIACAL LIQUOR, &c.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY,
and every Article suitable for
GAS AND WATER WORKS.

CLOTH GAS-BAGS FOR MAINS,

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.

T. BUGDEN, Manufacturer,
79, GOSWELL ROAD, LONDON, E.C.

TO GAS COMPANIES.

GEORGE McKAIG,
MANUFACTURER OF
GAS-PURIFYING WOOD SIEVES,
153, CLEVELAND STREET,
DONCASTER.

It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

CARRIAGE PAID.

REDUCTION
OF
"UNACCOUNTED-FOR GAS."

Of the three essential conditions for this purpose—sound pipes, accurate measurement, and well-regulated pressure—the last two are covered by the following Patents held by our firm, viz.—

THE WARNER AND COWAN METER
AND
THE FOULIS STATION AND DISTRICT GOVERNOR.

The former is the ONLY THOROUGHLY RELIABLE METER IN EXISTENCE, being practically unvarying in capacity under all changes of water-line, and entirely free from any "compensating" or other extraneous mechanism.

The FOULIS GOVERNOR is for its purpose equally simple and efficacious, while it is the smallest, most compact, and cheapest Governor yet constructed. It may be placed under ground anywhere in the line of main, and covered over just as an ordinary syphon, and yet be under entire control, with a delicacy of action and simplicity hitherto unequalled.

The combined use of these inventions will materially assist in the important work now so generally carried on for the reduction of the

"UNACCOUNTED-FOR GAS."

W. & B. COWAN,

ORIGINAL LICENSEES AND MANUFACTURERS OF

WARNER & COWAN'S SELF-REGULATING GAS-METERS;

SOLE LICENSEES AND MANUFACTURERS OF

FOULIS'S STATION AND DISTRICT GOVERNOR;

(ESTABLISHED 1827.)

CHURCH STREET,
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BUCCLEUCH ST. WORKS,
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ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

S. OWENS & CO.,

WHITEFRIARS STREET, FLEET STREET, LONDON, E.C.,

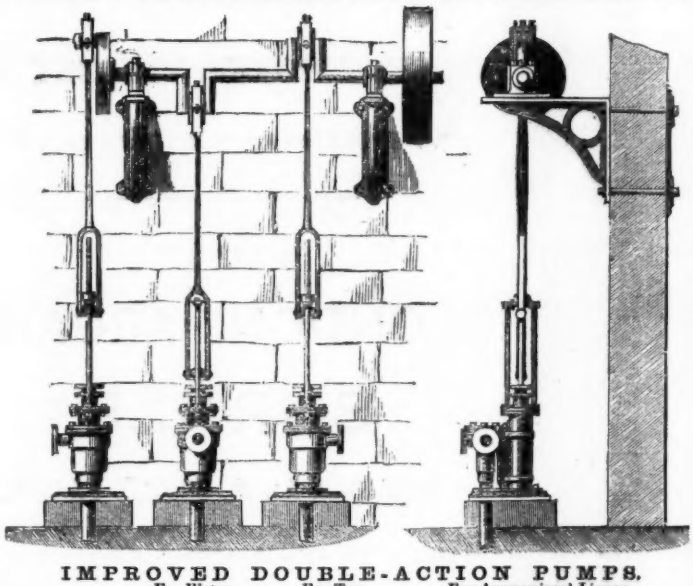
Hydraulic Engineers,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT DIRECT-ACTING STEAM-PUMPS.



IMPROVED DOUBLE-ACTION PUMPS.
For Water. For Tar. For Ammoniacal Liquor.

This illustration shows an arrangement of three (No. 179) Improved Double-Action Pumps driven from the same crank-shaft, as frequently supplied for use in Gas and Chemical Works. The suction and discharge pipes can be arranged for drawing from and delivering in any required direction.

These Pumps have been supplied to nearly all the large Gas Companies and Chemical Works, both for Pumping Water, Tar, and Ammoniacal Liquor.

GAS SYPHON PUMPS, IN COPPER OR SHEET IRON, ALWAYS IN STOCK.

Illustrated Catalogues sent post free on application.

THOMAS LAMBERT & SONS

MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

ALSO,

WROUGHT-IRON TUBES & FITTINGS.

SHORT STREET, LAMBETH, LONDON.

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WORKS:

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OFFICES:

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SOLE PROPRIETORS AND MANUFACTURERS OF

WOLSTON'S CELEBRATED

TORBAY IRON PAINTS.

W T I P

TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.

READY-MIXED PAINTS.

A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

Prices and Testimonials on application.

IMPROVED COMPENSATING GAS-METER.

HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

EXTRACTS FROM REPORTS.

"I am able to report that the Meters have given in each test most satisfactory results."—*Mr. H. Sporne, City of London Meter Inspector.*

"I consider the arrangement is a great improvement upon the Meters in present general use."—*Mr. T. Jackson, Meter Inspector, Birmingham.*

"I would observe from the results of my testings that the Meters are a great improvement on the ordinary Wet Meters in general use."—*Mr. H. Airey, Meter Inspector to the Metropolitan Board of Works.*

COPIES OF REPORTS SENT ON APPLICATION.

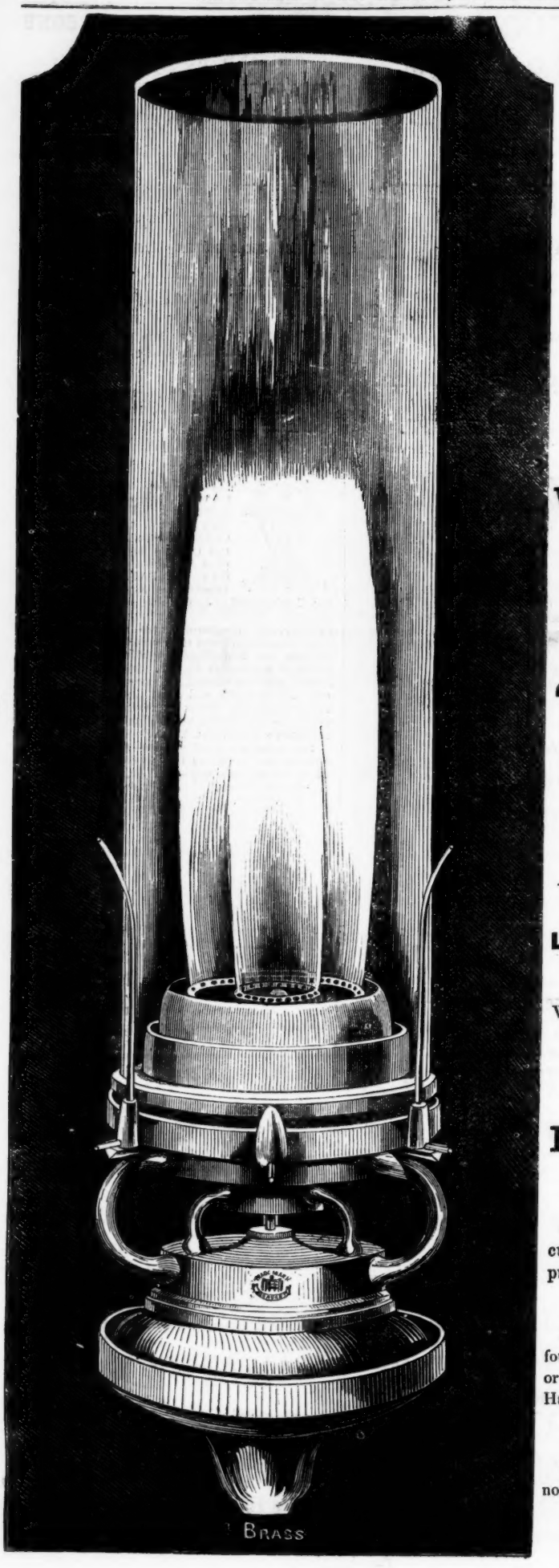
MANUFACTURED BY

JOHN BENT & SON,

WET AND DRY GAS-METER AND GAS APPARATUS MANUFACTURERS,

BELL BARN ROAD, BIRMINGHAM.

Established 1830.



PARIS, 1867.

LONDON, 1862.

TRADE MARK.

WILLIAM SUGG,

GAS ENGINEER,

VINCENT WORKS, VINCENT ST.,

WESTMINSTER, S.W.

PATENT

"LONDON" ARGAND BURNER,

NEW SIZE, No. N., DOUBLE FLAME,

With Self-Acting Governor.

LIGHT EQUAL TO 45 Parliamentary Sperm Candles of Six to the Pound.

Will burn any Quality of Gas from 12 to 50 candles, with

A VERY WHITE AND STEADY LIGHT.

Price 18s. each, with Chimney.

☞ **This Burner gives a greater amount of light per cubic foot of gas consumed than any other Burner yet produced.**

It can be used with Albatrine Shade, 20-in. diameter, for large Dining-Rooms or Halls; or with Large Silvered or Enamelled Reflector for Shops or Warehouses; or for Harbour and Signal Lights, Clock-Towers, &c.

The Sizes of the Patent "London" Argand Burner are now as follows:—

OLD SIZES: Nos. A, B, C, D, E, F, G, and H.
NEW SIZES: J, K, and N.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

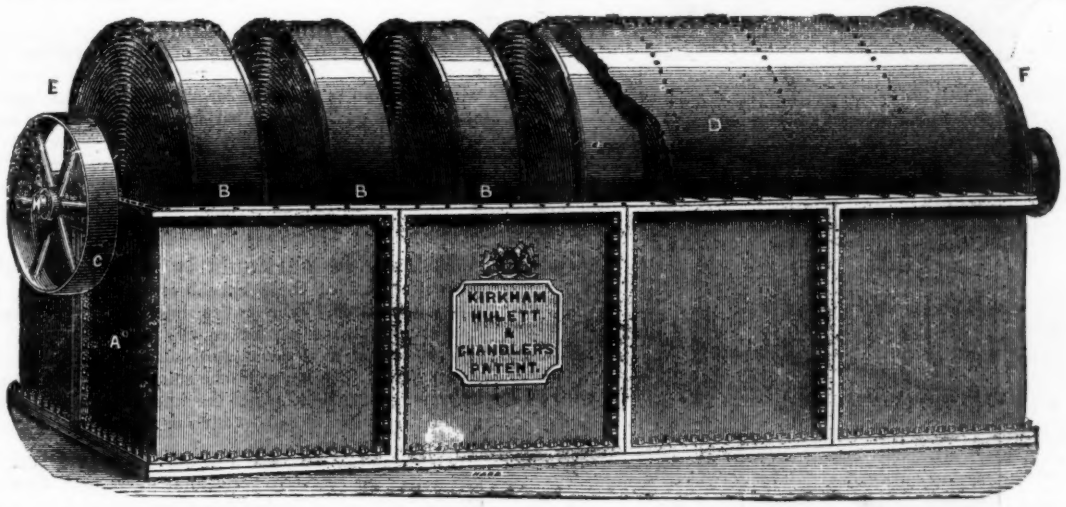
London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

July 2, 1877.

STANDARD WASHER AND SCRUBBER.



The advantages of the Apparatus will doubtless be understood by those interested in gas manufacture.

The principal points of any Apparatus for the extraction of ammonia may be summarily stated as follows: —

1. **A large amount of Surface is desirable.**
2. **Such Surface should be always effectually Wetted.**
3. **The Surfaces or Scrubbing Material should cause no Pressure.**
4. **The Gas should meet various strength Liquors on its course.**
5. **However small the quantity of Water used, it ought to operate over the whole Surface.**
6. **Changing Scrubbing Material is both Objectionable and Expensive.**
7. **Economy both as to Space occupied and Cost of Apparatus is an important item.**

All these requisitions are supplied by the above Apparatus, of which the following is an explanation:—

A is a cast-iron tank, formed into several separate water-tight compartments.

B B B volutes of sheet iron fitted to the centre shaft, which is driven by the pulley, C, and causing the said volutes to revolve each in a separate compartment filled with water or other fluid.

D, the cover, has partitions fitted into it corresponding with those in the tank, sufficient space being left between the top of the partition in the tank and the lower edge of that in the cover, to allow the gas a free passage through the first volute to the second, and so on to the third, fourth, &c.

The action is as follows:—The crude gas entering at E is partly washed in the first compartment, which becomes 10 or 12 oz. liquor, or stronger if required, according to the quantity allowed to enter per ton; the gas then passes to the second, where the liquor is of a less strength; thence into a weaker liquor, as it passes from one compartment to the other, finishing at the last compartment or outlet, F, with clean water, which is constantly flowing and running over from one compartment to another, until it reaches the last space, from which it flows from the outlet-pipe into the well or tank ready for sale or removal.

Taps are inserted in each compartment for the convenience of drawing liquor for testing, &c.

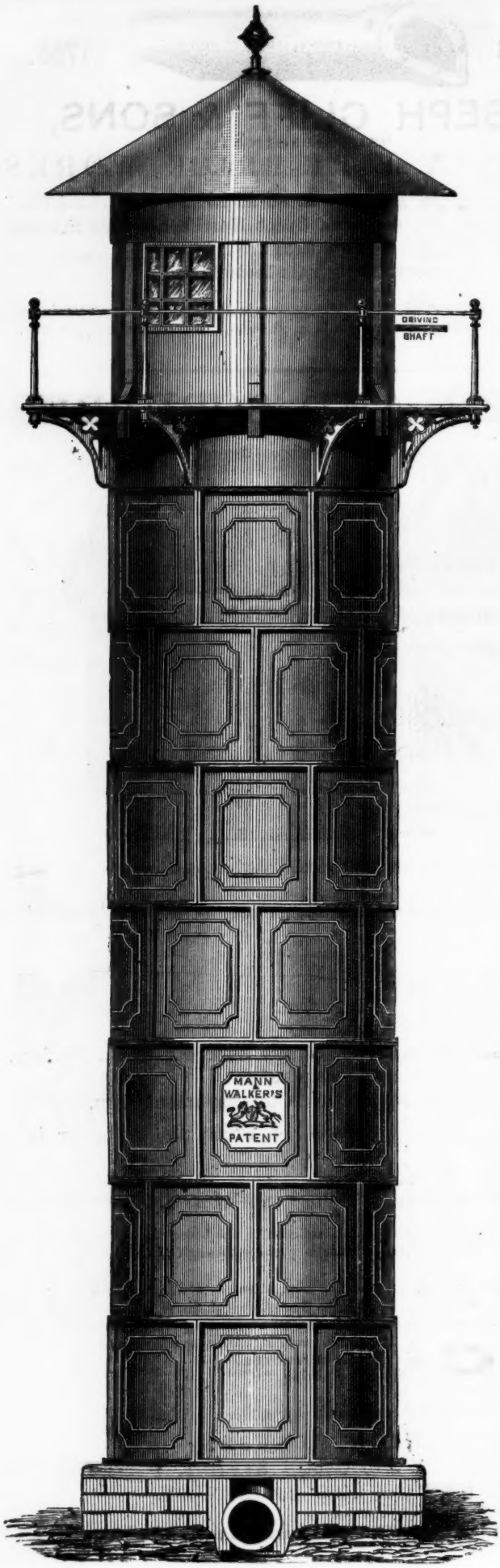
Applications as to Cost, &c., may be obtained of either

Mr. D. HULETT, 55 & 56, HIGH HOLBORN;

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER;

Or Messrs. CHANDLER, 104, NEWINGTON CAUSEWAY.

Inquirers will please state their Maximum Day Make.



C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

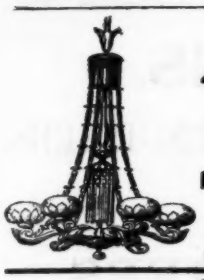
They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

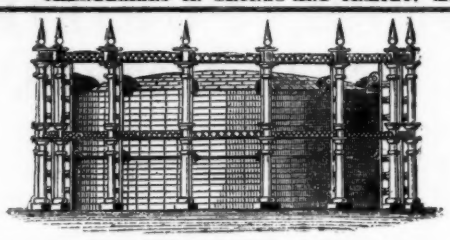
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

NOTICE OF REMOVAL.

G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

Begs to intimate to his numerous connexion that, for the convenience of Gas Managers and others waiting upon him, he has removed from

89, HIGH STREET, STOURBRIDGE,

and that in future his HEAD OFFICES will be

123, NEW STREET, BIRMINGHAM,

Where all communications and inquiries should be addressed.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

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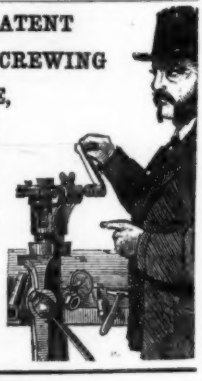

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Of superior quality, delivered in trucks at any Railway Station in England, or shipped on board at Hull, Grimsby Docks, or Barrow-in-Furness.

Purified gas per ton of coal in cubic feet (average)	**10,262**
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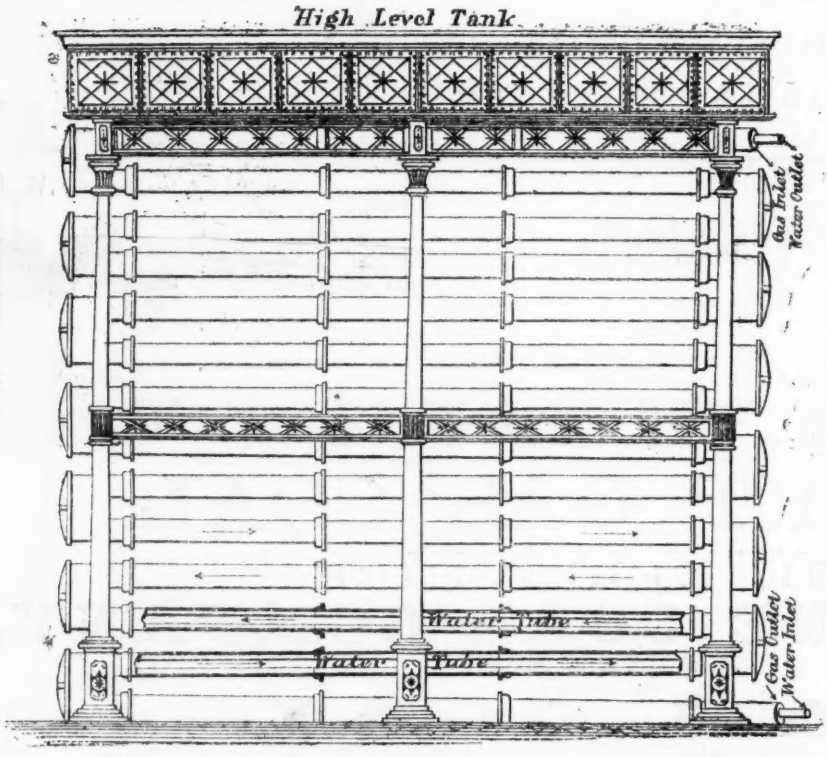
CUTLER'S PATENT GAS-WASHER.

(For Illustration and Description, see "Journal" for the 4th inst., page 392.)



Description of Morris & Cutler' Patent Condenser.

The Condenser may consist of pipes arranged in tiers as shown, or in any other form most convenient to the site available, each tier being connected with special connexions, and containing within same either one or more coils of smaller pipe through which water is passed, being supplied from any convenient source of supply, the water passing in an opposite direction to the gas, so that the coldest water is at the gas outlet. The power of the Condenser can be regulated precisely in proportion to the quantity of water allowed to pass through, which is not in any way contaminated, but simply heated by the hot gas, and advantage can be taken of its being at a high level to carry it to a high-level cistern, from whence it can be used for supply to boiler or any other purpose. (The Condenser itself may form the support for a high-level cistern as illustrated.) By an arrangement of valves the water may be shut off, and an air orifice opened, when air will pass through instead of water, or both air and water can be shut off. The power of the Condenser is, therefore, entirely under control.

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"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

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PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

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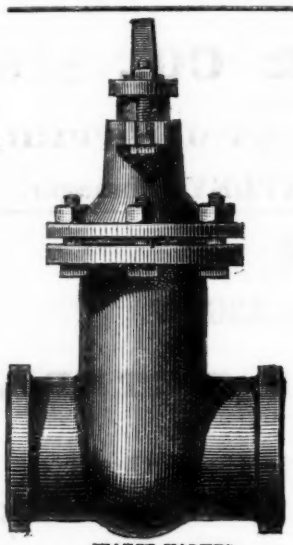

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And all other Machinery for

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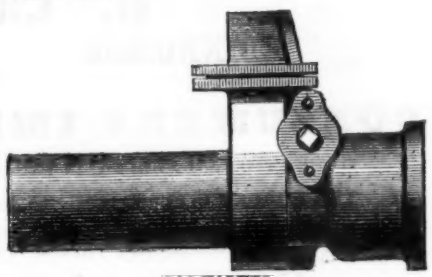

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Offices, Mersey Street, Warrington, April 23, 1877.

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"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

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"Yours truly, "JAMES PATERSON."

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